CREATIVITY AND EDUCATION

A STUDY OF THE RELATIONSHIPS BETWEEN MEASURES OF CREATIVE THINKING AND A NUMBER OF EDUCATIONAL VARIABLES IN INDONESIAN PRIMARY AND JUNIOR SECONDARY SCHOOLS.

THESIS :

Untuk memperoleh gelar Doktor dalam ilmu Psikologi pada Universitas Indonesia di Jakarta, dibawah pimpinan Rektor Universitas Indonesia Prof. Dr. Mahar Mardjono, dipertahankan terhadap keberatan-keberatan umum pada hari Sabtu tanggal 26 Nopember 1977 Jam 10.00 wib.

SUKARNI CATUR UTAMI MUNANDAR

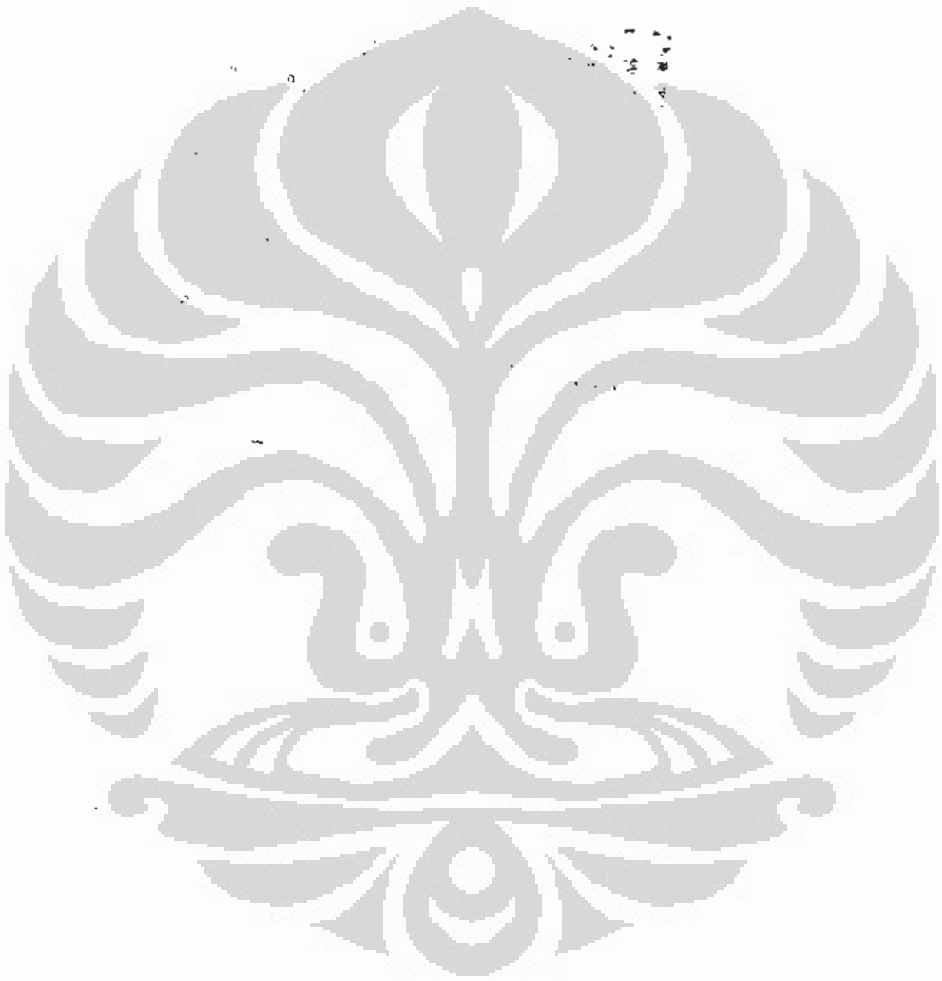
Lahir di Leiden, Nederland

PROMOTOR : PROF. DR. P.J.D. DRENTH

CO-PROMOTORS: PROF. DR. SLAMET IMAN SANTOSO

PROF. DR. SETIJADI

PROF. I.R. POEDJAWIJATNA



Two roads diverged in a wood,
and I
I took the one less traveled by,
And that has made all the difference.

ROBERT FROST

ACKNOWLEDGMENTS

Since the 1950s the pragmatic use of psychology in Indonesia has been more and more recognized. Psychological tests have been used in an increasing scale in the field of education, industry and by various branches of the government. The need for appropriate methods of assessment has however often found psychology ill prepared.

As psychologists we are often requested by large industries and by governmental agencies to identify potential managers and leaders possessing 'creative ability'. Especially in developing countries, including Indonesia, the need for creative persons who are able to make innovative contributions to the welfare of the nation, is enormous. But it is also a fact that we lack the appropriate means to identify such persons. In general we have to rely on the traditional intelligence tests, on projective techniques or on personality inventories, which are often not yet standardized or validated for use in Indonesia.

Recognizing the need for inventive individuals, we are aware that we have to look for creative potential in children and for ways to cultivate it. Some authors even claim that creativity need to be nurtured from birth on, and that by the time a child enters school, an important part of his creative talent may have been stifled by an inappropriate attitude from parents. This study then is an attempt to draw attention to the topic of creativity and to develop some instruments to identify creative potentiality in children.

I owe thanks to many people who in one way or the other have contributed to the completion of this work.

In the first place I wish to acknowledge my deep appreciation to Professor Dr. P.J.D. Drenth for his profound guidance as my promotor. From the very beginning his valuable comments and suggestions have guided me in preparing and in conducting the study and in writing my thesis.

I like to express my sincere appreciation to Professor Dr. Slamet Iman Santoso for his invaluable contributions to the development of psychology here in Indonesia, and for his generosity to be my co-promotor, without whom this thesis could not be finished on time.

My special thanks are conveyed to Professor Dr. Setijadi, Director of the Office of Educational and Cultural Research and Development, who not only gave me fruitful suggestions and stimulation, but also provided me with the facilities to conduct the empirical study.

My gratitude is further extended to Professor I.R. Poedjawijatno for his cooperation and understanding to read my thesis and to give me some sound critic and advice.

I also extend my gratitude to Mrs. Dr. S. Sadli, Dean of the Faculty of Psychology for granting me a leave of absence of three months to go to the Netherlands preparing for my thesis writing.

It is with great appreciation that I acknowledge Professor Dr. Mahar Mardjono, Rector of the University of Indonesia, and Professor Dr. Suyudi for their arrangements with regard to the financial resources for this study.

I am indebted to Mr. Schneiders, Cultural Attache of the Royal Dutch Embassy, the Ford Foundation ,the Social Science Foundation of Indonesia ,the Free University of Amsterdam and the Catholic University of Nijmegen in providing me with the facilities for this study.

Thanks are due to Mr. Tobing, Head of the Computing Centre of the Office of Educational and Cultural Research and Development, and to drs. N. Bleichrodt of the Free University of Amsterdam who assisted me in processing the data with the computer.

I also wish to express my thanks to Drs. Mugijadi, Secretary, Drs. Rachmat Wiradinata, Director of the Centre for Research and Evaluation, Miss Christina Mangindaan and drs. Soedijarto, Director of the Centre for Curriculum and Educational Facilities Development of the Office of Educational and Cultural Research and Development, for their arrangements and to render me with the necessary information.

I like to acknowledge the staff of the Faculty of Psychology, University of Indonesia, and the teachers and parents who have contributed to the data needed for this study, as well as the graduate students who assisted me in the data collection and the data analysis.

I also owe thanks to the Heads of SD Manggarai, SD Taman Harapan, SD Tanah Abang, SD Kebayoran Lama, SD Cilacap, SMP Melawai, SMP Tebet Utara, SMP Jembatan Batu, SMP Kebayoran Lama, and SMP Cikini for their cooperation, and to the students of the participating schools who were so willing to engage in a four- (or even five) days testing despite the fact that they were in the examination class.

My wholehearted gratitude to the staff of the Department of Child Psychology for their understanding in allowing me time to devote myself

to this study, as well as for their assistance in the preparation for the promotion ceremony. Needless to say that my sincere thanks go to dra. Ediasri Totoatmodjo, Head of the Department, and to dra. Jaumil Achir for their willingness to be my paranymph, and to all the students who had great share in arranging the promotion ceremony.

I am grateful to Mrs. Bambang and miss Krissetriawati for their conscious efforts in typing my manuscript.

To all the others who have given me encouragement and assistance and whose names I have not mentioned I herewith extend my gratitude.

Finally, there is no adequate way of acknowledging the enormous contribution of my husband, who despite heavy commitments of himself, has always given me moral support and actual assistance whenever needed.

To him and to our four children - Pammy, Gita, Tata and Didit - this work is dedicated - for all their love and understanding.

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INTRODUCTION

1. THE NEED FOR CREATIVITY RESEARCH

From any aspect of life from which we may view, there is a desperate need for creativity. Rogers stated (1954): 'Many of the serious criticisms of our culture and its trends may best be formulated in terms of a dearth of creativity' (p.249). We are in a mortal struggle for survival. We encounter challenges on all fronts, scientific and cultural as well as economical and practical. Advances in automation in modern industry no longer call upon men's work individual decision making and constructive thinking. Increased leisure time require direction into channels of creative effort, instead passive entertainment and regimented group action are overwhelmingly predominant. Even in individual and family life, there is a strong tendency toward conformity and stereotypy, as if to be original or different is felt to be dangerous.

The accelerated technological advances on the one hand and the exploding population with less natural resources available on the other hand, require more strongly than ever to make creative adjustments and to seek imaginative solutions.

The same picture holds true for the field of education. In his inaugural address on "Creativity" Guilford stated (1950):

> 'The most common complaint I have heard concerning our college graduates ... is that while they can do assigned tasks with a show of mastery of the techniques they have learned, they are much too helpless when called upon to solve a problem where new paths are demanded.'

At the same time he emphasized the 'appalling neglect' of the study of creativity by psychologists.
Examining the index of the Psychological Abstracts since its origin, he found that of the approximately 121.000 titles listed in 23 years, only 186 were indexed as definitely bearing on the subject of creativity.

The major interest in the creativity disposition and the recognition of its importance for knowledge came from the fields outside of psychology. Large industries recognized the enormous value of new ideas. Various branches of the government are asking for individuals who have inventive potentialities.
These needs have found psychology ill prepared.

One of the major conceptual blocks for the study of creativity has been the conception of creativity as an inherited property of the genius (Razik 1967): 'Assumably ... creativity is where one finds it, and little can be done through education to affect it' (p. 301).

Another conceptual block for the 'creativity movement' centered in the measurement instruments commonly used in the schools: the traditional intelligence tests to assess the capacity of students for learning and the achievement tests to judge the progress students make on their way through the schoolprogram. Both intelligence and achievement tests were mostly limited to tasks for which there were single, predetermined 'right' answers (convergent thinking). These

traditional measures are deeply rooted in school practice. Divergent and creative responses and abilities not fitting the school norm have not been measured, nor operationally valued or rewarded in systematic ways. The development of the student as a growing creature has been neglected (Razik 1967).

Another important reason for this deficiency on the part of psychology may be attributed to the difficulty of the problems of creativity themselves (Guilford 1959). A practical criterion of creativity is difficult to establish, apart from difficulties in terminology. Wallach commented on this (1970): 'what is called creativity today may simply describe what was called by some other name in the same culture only yesterday' (p. 1211). Environmental, as well as motivational and temperamental factors play an important role in creative productivity. Creative people differ considerably in performance from time to time.

We cite Guilford (1959):

> 'This means that any criterion, and probably any tests of creativity as well, would show considerable error variance due to function fluctuation. Reliabilities of tests of creative abilities and of creative criteria will probably be generally low. There are ways of meeting such difficulties however. We should not permit them to force us to keep foot outside the domain' (p. 154).

Another reason for the oversight of problems of creativity according to Guilford is a methodological one. The quest for easily objectifiable testing and scoring has directed us away from the attempt to measure creative abilities, which call for divergent types of tests allowing for some subjectivity in scoring.

Still another reason for the neglect of the problems of creativity is to be found in the general adoption of the stimulus-response model in learning theory (Guilford, 1959). The limitations of this model become apparent with regard to the higher thought processes, including problems of creative thinking. Such processes cannot be described in terms of stimulus-response concepts. A comprehensive learning theory must take into account creative activity.

2. RATIONALE OF THE STUDY

2.1. The Creativity - Intelligence controversy

Since Guilford in 1950 called attention to the neglect of creativity in education, and since he proposed his 'structure of intellect' model (to be further reviewed in chapter II) in which he distinguished between convergent and divergent cognitive operations, the convergent thinking abilities underlying the traditional intelligence tests and the divergent thinking abilities presumibly being indicators of creativity, interest in the relation between creativity and intelligence, particularly the extent to which the latter can account for the former, has been considerably increased.
The question of concern can be formulated as follows:

> 'Is creativity (as measured by the divergent thinking ability tasks) an aspect of cognitive functioning that stands apart from the traditional concept of general intelligence?'.

After two decennia of intensive research the controversy still exists whether creativity is a unified dimension of cognitive behav-

ior that can be distinguished from intelligence as operationalized in the traditional I.Q. tests (Wallach and Kogan 1965).

If creativity and intelligence are different aspects of mental functioning or if creativity is a dimension independent from intelligence, one would expect that intercorrelations among creativity tests will be high and that correlations between intelligence and creativity measures will be significantly lower.

In fact results of different studies (to be further elaborated in chapter II) are not clear in this respect. Much seems to depend on the type of tests, the nature of the samples under study and on the testing context.

2.2. The role of creativity, intelligence and memory in school achievement

Related to the issue of the creativity - intelligence dimensionality, is the question of the role that creativity and intelligence play in school performance.

Research workers increasingly turned their attention to this problem and its implications for education.

Torrance (1959), Getzels & Jackson (1962) and Yamamoto (1964d) came to the same conclusion from their independent studies: namely, that high creativity groups did not differ in achievement tests from the high intelligence groups, although there was quite some difference in mean intelligence quotients between these two groups in all three studies.

Torrance (1959) presented the hypothesis that the imaginativeness, curiosity and originality of the high creative subjects enabled them to compensate for what they lack in memory and other factors measured by the traditional test of intelligence.
Although Yamamoto's results support the earlier results of Getzels & Jackson and of Torrance, he emphasized that 'generalizations should be carefully made because of the rather inadequate sampling design.' (1964d,p. 788).

Further studies should be made to what extent creativity contributes to schoolachievement, especially among students of average calibre.

Apart from the question of clarifying the relationships between intelligence and creativity and their possible use as predictors of school-success, such studies are very important in that they at the same time provide information about the educational system.
If we apply a battery of creativity, intelligence and memory measures and relate these measures to schoolperformance to find out what are their relative contributions toward success in school, we may make inferences from the resulted relationships about the nature and the goals of the educational system ('inverted diagnostics', Hofstee 1969). We cite Hofstee (1969):

> 'Meer in het algemeen willen we onder averechtse of systeemdiagnostiek verstaan een indirekte empirische analyse van de wijze waarop het sociale systeem funktioneert, via bestudering van individuele verschillen' (p. 486).

In this case the relationships between tests and criteria, say schoolperformance, do not serve to make decisions about individuals, but to provide information about the psychological nature and the meaning of the criterion (Drenth 1977a).

If for example achievement tests in a school appear to correlate highest with rote memory measures, these findings are telling us more about the educational system than about the tests. It does not mean that rote memory tests are the best predictors of school performance, but it does indicate that apparently memorizing has a high value in that school.

In this connection, Drenth(1975b)pointed out:

> 'It is clear that, for this purpose, tests are needed, which on the one hand have a known and accepted psychological meaning (because after all they are used as reference points for the examination of educational objectives), but that on the other hand are rather diverse in content, so that as varied a picture as possible of the educational system can be presented' (p. 13).

2.3. Creative attitude -a non aptitude trait of creativity

A further area of interest is the question of non-aptitude traits and how they might contribute to creative performance.

It is generally accepted that creative productivity is a complex variable comprising attitude, motivational as well as temperamental factors beside the cognitive abilities. The importance of certain personality attributes in the making of eminent persons has been subject of many studies. The studies of Roe (1952), MacKinnon (1962)

and Cattell (1968) all indicate that the personality profile of outstandingly creative persons differ from that of the average man.

In his factor analytic studies concerning the primary traits of creativity (this topic will be further elaborated in chapter II), Guilford (1959) made a distinction between 'aptitudes for creative thinking' and 'non-aptitude traits related to creativity'.

The aptitude traits of creativity include fluency and flexibility of thinking and originality, these traits being operationalized in the divergent thinking tasks. But, as Guilford emphasized (1971), creative productivity is not synonymous to divergent production. Non-aptitude traits should be expected to have significant determining effects upon whether or not an individual exhibits creative performance.

Factor analytic investigation indicated low but statistically significant correlations between these non-aptitude traits (such as esthetic appreciation, self-confidence, attitude of unconventionality) with aptitude traits of creativity (e.g. fluency, flexibility and originality in thinking). It has been stressed by many reseerchers that the problem of creativity should be attacked from various perspectives.

Devising a Creative Attitude Scale in which various non-aptitude traits of creativity have been operationalized, and examining the relationships of these variables with scores on divergent thinking (creativity) measures on the one hand and with scores on criterion

performance (e.g. a creative product, or ratings given by superiors or teachers on subject's creativity) on the other, could yield more information about the nature of creativity and the way to assess it.

2.4. Teachers and parents attitude about creativity

No one would dispute that abilities and personality characteristics are, to a large extent, moulded by environmental factors and influences such as family and school. Therefore a study on creativity should possibly include not only personal but also environmental factors.

In our present age of technological and scientifical advances, changes occur so rapidly that educators cannot possibly foresee exactly what kind of knowledge a child will need ten or more years later to meet life's problems when he is an adult. What educators can do is to develop the attitude and abilities in their pupils that will help them to meet any future problems creatively and inventively. Just cramming of knowledge would not help a student much, because it is quite possible that in the future he could not make any use of that information.

Yet what we observe is that in our present society 'we receive so much spoon-feeding in terms of how-to-do-it instructions - in school, at home and at work- that most of us lack almost any opportunity for being creative' (Parnes 1963, p. 337).

We cite Parnes (1963) further on the subject:

> 'The individual's creative ability is frequently so repressed by his education and experience that he cannot even recognize his full potential, let alone realize it.
> Once he can be helped to do so, he may attain what Maslow calls 'self-actualization'.
> Education can do much to help the individual achieve his fullest self-realization, whatever his level of native capacity. Many people seem to possess the seeds of creativeness, but the environment fails to provide the proper nourishment for growth.
> Therefore, those persons never fully live' (p. 339).

Studies have shown that optimum development of creative thinking abilities is related to a certain teaching approach. In a non-authoritarian climate, where self-initiated learning can be developed, where the teacher has confidence in the child's ability to think adventurously and in new directions and where the child is given the opportunity to work according to his needs and interests, creative abilities are seen to flourish.

Yet according to Getzels & Jacksons (1962) teachers give more preference to the high IQ students than to the high creative students if asked which students the teacher most enjoys and most prefers to have in class.
Also Bachtold's study (1974) indicates that teacher's perception of the ideal pupil bears very little resemblance to the behaviors which were found to be characteristic of creative persons.

Attempts should be made to investigate to what extent teachers and parents attitudes and behaviors in Indonesia are conducive in facilitating an educational environment where children's creativity will be nurtured.

2.5. Specific interests for Indonesia

As a developing country, Indonesia is in great need of creative individuals who may contrubute to the arts, the sciences and technology, to the welfare of the nation in general. Bearing this in mind, education should be aimed to serve the needs of the nation in cultivating the creativity of its population.

Recognizing (assuming) that creativity is a potential property of all men, potentially identifiable and subject to nurture through suitable education, one of the crucial problems is how to identify creative potential, and another how to nurture creativity in children through educational experiences.

Whereas traditional measures of intelligence emphasize convergent thinking - logical reasoning toward single right answers - measures of creativity call for new ideas, original and unconventional responses, and breaking away from the usual path. We need tests including these new dimensions.

Research is needed to explore the nature of creativity and its relationships with other cognitive dimensions, as well as its relationships with personal and environmental variables.

3. GENERAL PURPOSE OF THE STUDY

The general purpose of this study is to draw attention to the problem of creativity: the need to identify creative potential and the need to develop creativity in children.

Its main objective is the development of some measures of divergent thinking (creativity tests) and to determine their relationships to other intellectual measures on the one hand, and to a number of educational variables on the other hand.

The more specific objectives will be exposed in chapter IV.

4. SIGNIFICANCE OF THE STUDY

The development of a battery of divergent thinking ('creativity') tests might open wider perspectives of intelligence testing in Indonesia. Thus far, assessment of intellectual abilities is mostly limited to the cognitive, convergent thinking and memory operation categories (in terms of Guilford's Structure-of- Intellect model, 1956).

The instruments to be developed in this study (the Creativity Battery, the Creative Attitude Scale and the Scoring Scheme to evaluate creative writing ability) might serve the need to identify creative potential. They could be used in selection and admission procedures as well as in individual, diagnostic practice.

From the relationships of the divergent thinking measure to academic performance one can evaluate the degree to which academic performance can be predicted from a battery of creativity tests.

Another not less important applicability of the creativity measures is to use them as informative evaluators of the educational system (Drenth, 1977), to clarify and analyse educational objectives and outcomes ('inverted diagnostics, Hofstee, 1969).

The study of relationships between the test variables as well as between the test variables and non-test variables also serve a theoretical goal in that it seeks to clarify classical questions in the field of creativity, e.g. the dimensionality question of creativity and intelligence, the threshold of intelligence concept, the predictability of school performance by creativity and intelligence tests, relationships between traits of creativity, the influence of age, sex, culture and other environmental conditions on creativity etc.

5. BASIC ASSUMPTIONS

In designing the present study, some basic assumptions were postulated:

5.1. We believe that, particularly in the case of children, the study of creativity should focus on creative thinking processes as they occur within the individual. In the past the identification of creative persons was based on the products they have generated. With the present knowledge that creativity can be fostered or stifled by environmental influences, interest today is centered on ways of discovering potential creativity and how it can be given opportunity to develop. Hence, the emphasis is on the act of producing (processes) rather than on the end result of the act.

5.2. Implicit in this approach, is the assumption that creative thinking processes can be found to some extent in all people.

The various abilities defined in Guilford's (1956) Structure-of-Intellect model-the theoretical framework of the present study-are assumed to be continuously distributed variables.

The increasing interest in individual differences and the democratization of education also contribute to the changing concept of creativity as a 'continuum', possessed by every individual in varying degrees.

5.3. Creativity is the resultant of processes of interaction between an individual and his environment. Individuals affect and are affected by the environments in which they live and as such variables in both the individual and the environment may facilitate or may inhibit creative effort. The implication is that creative abilities can be improved through education.

5.4. Creativity is a multi-dimensional construct. Within that concept primarily the divergent thinking abilities are included, but other processes, outside the divergent thinking category, e.g. cognition, convergent thinking, memory and evaluation, make significant contributions toward creative performance. Non-aptitude traits, such as motivation, attitudes and interests have significant determining effects on the question whether or not an individual exhibits creative behavior. Hence, testing for creativity should involve the construction of multi-dimensional predictor variables as well as multi-dimensional criterion variables.

5.5. We assume that fluency, flexibility and originality of thinking are the primary traits of creativity (identified by the studies of Guilford and others). Consequently, for the purpose of empirical research 'creativity' is defined as a process that manifests itself in fluency, flexibility and originality of thinking.
By this definition we confine ourselves to the study of thinking processes, operationalized in the battery of divergent thinking tasks to be developed. Further use of the term 'creativity' will refer to these divergent thinking processes.

6. PLAN OF THE STUDY

The first chapter was a brief introduction into the basic concepts and ideas leading to the design of the present study. Its general purpose as well as the significance of the study has been stated.

Chapter two presents a review of the literature related to the topic under study. After a brief historical overview of creativity research, the most relevant types of creativity research and their main findings were discussed. Furthermore, some definitions of creativity, viewed from different perspectives are presented, followed by our research definitions.

Chapter three deals with the current school system in Indonesia, its development after the independence of Indonesia, as well as some of its main problems.

Chapter four exposes the more specific objectives of the study. Following the formulation of the hypotheses, the design of the study will be presented.

The procedure of the Pilot Study - involving a try out and an item analysis of the newly developed instruments - and its results are discussed, to be followed by a description of the nature and rationale of the instruments to be used in this study. Next the main study is presented, with a description of the sample, the data collection and the methods of data analysis.

Chapter five presents the research findings, comprising six sections:

- The first section is concerned with the reliability studies of the test variables used in this study.
- The second section deals with the validation studies of the Creativity Battery.
- The third section focuses on the relationships between non-aptitude traits of creativity (creative attitude) with aptitude traits (the divergent thinking measures) and with external criteria of creativity (composition writing and teacher ratings).
- The fourth section will be primarily concerned with analysis of variance: the differences in performance among three primary schools, among three junior secondary schools, and the differences in performance between the primary and the junior secondary schools.

- The fifth section will be devoted to studies on the Ideal Pupil Checklist: the perceptions of teachers on the ideal pupil as compared with those of parents on the one hand, and the perceptions of teachers and parents on the ideal pupil as compared with experts' conception of the creative personality on the other.
- The final section focuses on a description of twenty selected personal and environmental variables and their relationships with the test variables.

In chapter six the overall results of the study are discussed, also in relation with other studies as mentioned in literature. A number of suggestions for further research will be given.

The last chapter summarizes the main results and conclusions of the study.

Chapter II

REVIEW OF THE LITERATURE

This chapter presents an overview of research findings as found in the available literature and relevant to the present study.

- Firstly, before commencing on specific questions, a historical overview of creativity research will be given, followed by a presentation of the instruments that have been constructed to measure creative productivity, in terms of age levels; instruments to assess creativity for children in the early school years, the elementary school years, the high school years and the college and adult years.
- Secondly, different perspectives from which creativity has been investigated will be briefly mentioned: studies concerning the products of creativity, the personality traits of creative individuals, studies dealing with creative processes and studies related to environmental conditions.
- Thirdly, attention will be given to various definitions of creativity, also with respect to product, person, process and press.
Moreever, our own concept of 'creativity' or 'creative thinking ability' and the other important concepts in this study will be defined.
- Fourthly, important contributions in the field of creativity, such as the work of Guilford and his associates, including his Structure-of-Intellect model as the conceptual frame work of the present study, the work of Getzels and Jackson, of Torrance, and of Wallach, and some crucial problems in creativity research, such as the dimensionality question, the threshold of intelligence concept and age related differences in creativity, will be discussed.

- Finally the criterion problem in creativity validation will be discussed: the question of ultimate, intermediate or immediate criteria, predictive and construct validity, the need for a multi-dimensional and a multi-criterion approach, and the use of teacher nominations and school performance as criteria.

1. HISTORICAL OVERVIEW OF CREATIVITY RESEARCH

Throughout man's history creativity has been a topic of interest, but it was not until very recently that it has become subject of scientific, empirical research. Among the ancients it was a generally accepted custom to ascribe divine origin, inspiration or direction to any great creative work. Creativity is a relatively new concept, only recently has it been taken over by science from religion, and it is still fraught with some mystical connotetions.
For centuries the common idea had been that only the extremely rare person is genuinely creative and that creativity is a divine gift.
In addition to being very rare, the highly creative person's behavior was often regarded as eccentric and even pathological (Lombroso, 1891; Kretschmer, 1931, cited by Vernon, 1973).

Creativity became an object of scientific research primarily because of the general interest in individual differences. The concept that there can be varying degrees of a quality possessed by different individuals was applied to creativity and this conception has opened the door to many kinds of research.

The strong British interest in individual differences was a natural consequence of Darwin's evolutionary doctrines. Galton was interested in the heredity of mental characteristics and he attempted to prove that the same principles underlying the heredity of physical characteristics can be applied to mental characteristics. Galton's 'Heredity Genius' (1869), was the first attempt at an empirical study of human abilities. His book is primarily devoted to a demonstration of the heredity linkages among eminent men in a variety of fields: scientists, statesmen and military commanders, poets, painters, writers etc., but to the neglect of family and other environmental influences.

Terman showed the same bias in his 'Genetic Studies of Genius' (1926-1959), although he gave greater recongnition to the role of personality, environment and schooling in the development of talent. Terman may be given credit for conducting the most extensive longitudinal studies in the history of psychology. He found among others lack of recognition and encouragement of brighter children in American schools. Terman's work, together with Hollingworth's (1926) studies of the difficulties of adjustment of very high-I.Q. children, had a considerable impact.

Up to the 19th century education was thought of as a privilege of the elite and aristocracy. Gradually through social reformers and politicians education became more democratic, providing equality of opportunity, regardless of wheallth and class.

With the Progressive Education Movement through the 1930s attention was focused on creative qualities in all children. Teachers and

parents observed that young children were naturally curious, exploratory, experimental and capable of fresh responses to their world (often in contrast to what was observed in children who had attended school for several years), and the term 'creative' was often used in describing such observations. Educationists are increasingly concerned as to whether the methods of teaching in schools may not only favor the conformist mentality and discourage spontaneous independent thinking (Vernon 1973).

In America the major impetus for creativity research dates from the work of Guilford and his associates beginning in the early 1950s. Guilford started his extensive studies on the structure of human intelligence, shortly after the second World War. Important to creativity research was the distinction he made between abilities for divergent thinking and abilities for convergent thinking. Convergent abilities have formed the main component of the traditional intelligence tests. Guilford redefined intelligence so as to include creative performance, or what he identified as the divergent production abilities.
Ever since Guilford's presidential address (1950), research on the development of creative behavior has been conducted on an increasing scale. Working on a project on Aptitudes of High-Level Personnel at the university of Southern California, his studies were confined to the adult world. But he has also opened the field to the world of children, since his tests and his concepts were used by other researchers in devising further tests in the educational field.

'A shaker of confidence' was the advent of Sputnik in 1957. It shocked America into asking whether its educational system was failing to produce creative scientists to maintain its technological lead in the modern world. In the presence of the Russian threat, 'creativity' could no longer be left to the chance occurrences of the genius. A number of programs were developed, and funds were made available to conduct studies on the identification and development of creativity.

To illustrate the tremendous increase of interest in creativity after Guilford's presidential address and after the Sputnik incident: Guilford (1970) mentioned about six publications yearly in 1930, but about 95 in 1965, according to the index of the Psychological Abstracts. Or in percentages: of all psychological publications, 0,12% related to creativity in 1930 increasing to 1.4% in 1969.

Two lines of further research stem directly from the work of the Guilford group: the work of Torrance and of Getzels and Jackson. Whereas the researches of Guilford and his collaborators have been concerned almost entirely with adults, the work of Torrance and of Getzels and Jackson focused on the child's world. They also differ in that they both devote attention to the developing of further assessment procedures.

What Guilford showed to be intellectually wrong in conceiving of intelligence in narrow terms, Getzels and Jackson showed to be also educationally wrong. They concluded from their studies on young adolescents that not only the intelligence tests are biased against the highly creative child, but also the teachers. Although it was proved that the

high-I.Q. students and the highly creative students were equally superior in school achievement, teachers preferred to have the high I.Q. pupils over the highly creative pupils in class. Their findings that I.Q. scores correlate with creativity scores up to a certain level of I.Q., but not beyond that point, lead to the formulation of the I.Q. threshold concept. This conception stimulated other researchers to conduct similar investigations (Torrance 1962, Yamamoto 1965, Wallach 1970).

Getzels and Jackson have been criticized for the fact that the samples they used in their studies (students from the University Laboratory School) were from the upper range of the I.Q. scale and that this restriction may have influenced their results.

Torrance and his co-workers at the University of Minnesota worked with younger children of various levels of ability and from public schools. He confirmed Getzels and Jackson's findings that above a 120 I.Q. there was almost no correlation between I.Q. and creativity. He estimated that about 70% of the creative population would have been missed if we depend solely on I.Q. tests to measure ability.

Using a checklist of 62 characteristics, a study was made to obtain teachers' concepts of the ideal pupil. From this study he concluded that apparently it was far more important to teachers that children be courteous, industrious, obedient, do their work on time than that they be courageous in ideas and convictions.

The results of Getzels and Jackson (1958), Torrance (1959) and of Yamamoto (1965b) arose interest in creativity performance as a criterion in the selection of 'gifted' children, supplementary to the traditional criteria of I.Q. and teacher's preference and judgments.

While Guilford, Getzels and Jackson and Torrance were primarily concerned with the intellectual abilities (or in Guilford's Terms: aptitude traits) underlying creativity, the studies of Barron (1955), McKinnon (1962), Taylor (1964), Cattell and Butcher (1968) focused on the personality structure of highly creative adults.

Roe's studies on eminent scientists (1952) may be regarded as a pioneer of this kind of studies. Her area of interest was whether there are specific qualities of personality, intelligence, background or upbringing characteristic of eminent scientists. Although her approach was more clinical than psychometric, her conclusions have been generally confirmed by later work.

Whereas in the early years of creativity research, projects dealt mainly with the identification of creative talent, later on more and more studies were devoted to the deliberate development of creative ability. In 1959, at the University of Utah Research Conference on the Identification of Creative Scientific Talent, for the first time a committee was appointed to report on 'the role of educational experiences in the development of creative scientific talent' (Parnes 1963). Their findings indicated that creative productivity can be developed by deliberate procedures (Taylor 1959). This view was confirmed by other research

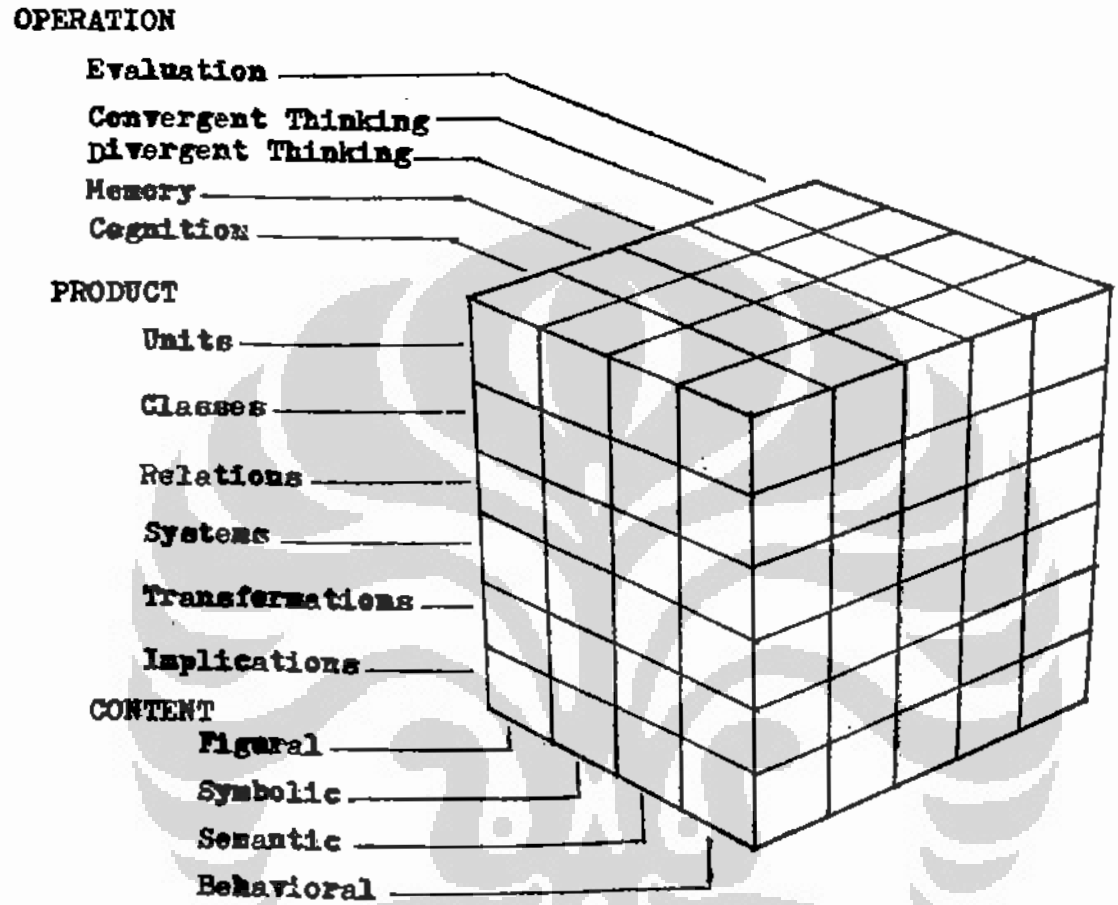


Figure II-1: GUILFORD'S THEORETICAL MODEL FOR THE COMPLETE 'STRUCTURE OF INTELLECT'

studies. Maltzman and his associates at the University of California concluded from a group of research studies on originality that 'originality' is a learned form of behaviour which does not differ in principle from other forms of operant behavior (Maltzman, Simon and Light 1959). Research into the effects of creative problem solving programs revealed that such programs improved creative productivity (Meadow and Parnes 1959, Parnes 1958, Sommers 1961). In addition to projects involving creative problem solving, there have also been successful projects based on the integration of creative principles and procedures with conventional courses (Torrance 1960, Sommers 1961).

Related to the field of education are those studies concerned with the effects of teaching approaches or teaching methods on creative thinking abilities (Torrance, 1962; Hasan and Butcher, 1966; Sears, 1963). Hasan and Butcher report that the success of predominantly divergent thinkers is directly related to the degree of freedom and permissiveness and the lack of authoritarian discipline within a school.
Sears found positive correlations between creativity and teachers use of the technique of rewarding children by personal interest in their ideas rather than by evaluation.
Treffinger et al (1968) found that in-service education programs in creative problem solving facilitate teacher's ability to identify creative pupils, and that it seems possible to help teachers develop increased understanding and more favorable attitudes about creative problem solving abilities.

Another area of interest in creativity research has been based on the conception that creativity development is related to mental health. This view of creativity sees creativity in terms of complete character integration of the full functioning individual. Barron (1958) concluded from his investigations of creativity by studying ways in which creative persons differed from others in their responses to order and disorder, that psychological health is important for creativity. He found that the creatives tolerated disorder better than others.

Rogers (1959) sees man's tendency to actualize himself as the primary motivation for creativity and that it is the same tendency he discovered to be the curative force in psychotherapy.

Maslow (1962) distinguished 'special-talent' creativeness from 'self-actualizing' creativeness. The former is a result of high abilities in special fields; the latter shows itself as an effect of positive mental health and appears as creative flexibility and free energy to accomplish daily life affairs in a creative way.

Hebeisen (1960) administering a battery of creativity tests to a group of schizophrenics found that they manifested an astonishingly impoverished iamgination, inflexibility, lack of originality and inability to produce any kind of response to new problems.

The psychoanalytic conceptions of creativity as formulated by Freud (1949) however, see the source of creativity in conflict, creativity being an expression of neurotic patterns. The role of the unconscious seems to be important in creativity production. Kris (1950) speaks of

the ability to 'regress in the service of the Ego' to retrieve material from the preconscious as a vital aspect of creative production.

Somewhat akin to the mental health theory is the concept that creativity is the opposite of authoritarienism. The compartmentalization and stereotyping of the authoritarian personality prevents creative functioning. Hence the degree to which we have been dominated by authoritarian practice diminishes our creative potential. Investigations with the California Psychological Inventory show that flexibility (creativity) and tolerance (lack of authoritarianism) are well correlated (Gowen, 1967).

We follow Torrance (1965 p. 27-32) in presenting a historical overview of the instruments developed to measure creative thinking abilities. Since most of the efforts of the past have been limited to a particular age or educational level, it seems necessary to review these developments in terms of early childhood, the elementary school years, the high school years, and adulthood.

The early school years

A great majority of the early studies of 'creative imagination,' 'creativity,' or 'creative thinking' were limited to artistic manifestations of creativeness.

Among the methods which have been used in assessing the creative functioning of children are the following:

1. Inkblots (Kirkpatrick, 1900; Whipple, 1915)
2. Drawings (McCarty, 1924)
3. Paintings and verbalizations while painting (Grippen, 1933)
4. Tachistoscopically presented tasks with instructions to form new products; observations of imitation, experimentation, transformation of objects, acts of sympathy, dramatizations, imagery playmates, fanciful explanations, fantastic stories, new uses of stories, constructions, new games, extensions of language, appropriate quotations, leaderships with plans, and aesthetic appreciation (Andrews, 1930).
5. Observation of standardized situctions, such as ahousekeeping game, the fanciful naming of visual stimuli, leadership in imaginative games, and blockbuilding (Markey, 1935).

In all these early attempts to measure creative behavior, the correlation between such measures and traditional measures of intelligence tends to be low. Although Binet did not include measures of creative functioning in his battery of intelligence-tests tasks, he emphasized in his 1909 book the importance of creative behavior, imagination, inventiveness, and the like. Many of the exercises which he called 'mental orthopedics' and used with mentally retarded children resemble quite closely some of the current tests for assessing creative behavior.

The elementary school years

Of the many manifestations of creative thinking among children during the elementary school period, greatest attention has been given to creative writing and art.

Colvin (1902) used compositions, giving attention to such qualities as invention, sense of humor, imaginative power, and perceptive power. Simson (1922) used fifty sets of four small dots, representing the four corners of squares, as the stimuli for constructions which were used to assess fluency, flexibility and originality. The methods of McCarthy, Abramson, and Grippen were used with both preprimary children and elementary school children. Harms (1939) employed, in grades one through twelve, a test requiring the representation of words (mostly various actions) by single lines. Stephenson (1949) reports the use of a poetry-writing test and an art-form test.

The Torrance tests of Creative Thinking consist of four batteries of test activities, two verbal and two figural. Both forms can be used from kindergarten through graduate school. The Verbal Tests consist of seven parallel tasks; the activities involve 'asking questions about a drawing, making guesses about the causes of the event pictured, making guesses about the possible consequence of the event, producing ideas for improving a toy so that it will be more fun for children to play with, thinking of unusual uses of tin cans or cardboard boxes, asking provocative questions, and thinking of the varied possible ramifications of an improbable event' (1974, p. 4).

The high school years

Devices for assessing the creative thinking abilities of high school pupils have tended to be in the direction of group administered tests with verbal stimuli requiring verbal responses.

Colvin (1902) made use of his measures based on compositions with high school students, The Abramson, Harms, and Stephenson instruments, already mentioned, have been used with high school subjects.

Vernon (1948) used her Imaginative Construction Test (stories based on four colored pictures) with high school students.

Most of the recent studies involving high school students have made use of adaptations of a few of Guilford's tests, primarily his tests of divergent production abilities. Getzels and Jackson (1962) used four adapted tasks (Word Associations, Uses for Things, Hidden Shapes, and Fables) and constructed one of their own (Make - Up Problems). McGuire, Hindsman, Kinf and Jennings (1961), and Piers, Daniels, and Quackenbush (1960) used selected tasks from Guilford's battery, Guilford, Merrifield, and Cox (1961) administered Guilford's extensive battery to ninth grade students and found essentially the same factors as they had found previously with adults.

The college and adult years

Although there has been practically no experimentation in colleges with measures of creative thinking as a functional part of programs, a great variety of such measures have been applied in studies with college students.

In 1961 Chassell reported detailed data concerning a battery of twelve tests of originality. In his 1922 book, Boraas described eight types of tests of 'imaginative thinking.' Hargreaves (1927) used twelve tasks which he scored for fluency and originality. Maier and his associates

(McCloy and Maier, 1939) experimented with a variety of measures closely related to their interest in art education. Welch (1946) developed tasks which emphasize the perception of new combinations.

Owens, Schumacher, and Clark (1957) developed a series of tasks to assess creativity in machine design. Harris (1960) has developed two forms of a twenty-item test of creativity in engineering which has been standardized on engineering students. Buhl (1961) and others both in higher education and in industry have used the AC (Sparkplug) Test of Creative Thinking Ability among engineering students and various adult groups. This test includes problems calling for unusual uses of common objects, alternative explanations of conclusions, consequences of unusual occurrences, alternative solutions to problem situations, and the like (Harris and Simberg, 1959).

Barron (1958) and his associates at the University of California have developed a battery of tests for assessing originality. Other instruments which have been used with college students and other adults include: Flanagan's Ingenious Solutions to Problems (1 63), one of the few attempts to assess creative thinking through multiple-choice items; Fredericksen's Formulating Hypotheses Test (1959), an attempt to elicit creative-type responses and transfer them to machine-scoreable answer sheets by having subjects code their own responses; Burkhart's Object Question Test (Burkhart, 1962; Burkhart and Bernheim, 1963), which requires subjects to ask divergent questions about a given object such as an apple or paper clips; and Mednick's Remote Associates Test (1962),

which requires subjects to find a word which is an associative connective link between three disparate words.

Guilford's elaborate battery was originally devised for high level personnel. Thus, it has been used largely with college and professional personnel. Because of its length, most users have selected only a limited number of the test tasks. This work has been done within the framework of Guilford's 'Structure of Intellect Model' (Guilford and Merrifield, 1960). The most recent conceptualization of the creative thinking abilities includes the following factors and there are several tasks to assess each: sensitivity to problems, flexibility (figural spontaneous, figural adaptive, and semantic spontaneous), fluency (word, expressional, and ideational), originality, elaboration, and redefinition (figural, symbolic, and semantic).

As with preschool, elementary school, and high school subjects, studies involving college and adults subjects have shown consistently rather low relationships between measures of creative ability and measures of intelligence and scholastic aptitude.

2. TYPES OF CREATIVITY RESEARCH

In Golann's review of studies of creativity (1963) he noted that 'a striking feature of the literature on creativity is the diversity of interests, motives, and approaches characteristic of the many investigators'.

Welsh (1972) spoke of a pentad of perspectives on creativity: person, product, process, press and place. Translated into common grammatical terms, these nouns become the who, what, how, why and where of creativity and may in turn be phrased as basic questions to be asked by any researcher in this area of human behavior.

1. Who are the creative persons?
2. What is it they do that can be called creative?
3. How do they do it?
4. Why do they do what they do?
5. Where do they show their creativity?

Accordingly studies in the area of creativity may be viewed from these five different but interrelated perspectives:

1. The person himself, by means of an attempt to delineate his traits and characteristics.
2. The product of a person's endeavor, either a tangible object or a record of an outcome.
3. The particular individual psychological processes that lead to the product.
4. The various types of press, both personal and social, that motivate the individual to perform his creative act.

5. The place in which the person lives and works, considered as both geographical locus and point in historical time.

It must be stressed however that these different approaches are basically a matter of emphasis or a research strategy. No human being acts abstractly in a hypothetical vacuum. Golann (1963) commented that 'all of the possible emphases within the study of creativity require no justification other than nothing that each is capable of making important contributions'.

2.1. Studies of creative persons

In these types of studies the researcher often has to rely on the reports of biographers (or autobiographical statements when available) and on the judgments of historians, since these men were never subjects of psychological studies during their lives. Cox (1926) estimated the probable childhood intelligence quotient of 300 geniuses by evaluating biographical data. MacKinnon (1962) in his studies on American architects applied a considerable variety of tests, interviews and other techniques. He (1962) and Barron (1955) used the same approach in defining the characteristics of creative individuals. They selected people who were recognized as creative contributors in a particular field (e.g. by having members of the appropriate professional group nominate their most creative members). They contrasted this group to another less outstanding group of the same profession. Both groups underwent an intensive assessment to find out whether they could be differentiated in terms of personality characteristics.

Dellas and Gaier after reviewing more than two dozen studies in this area, concluded that there is a common pattern of personality traits among creative persons (1970). According to the summary of these authors, the creative person is characterized by the following traits: 1. independence in attitude and social behavior, 2. dominance, 3. introversion, 4. openness to stimuli, 5. wide interests, 6. self-acceptance, 7. intuitiveness, 8. flexibility, 9. social presence and poise, 10. an asocial attitude, 11. unconcern for social norms. Two additional traits seem to be more closely related to aesthetic than to scientific creativity: 12. radicalism, and 13. rejection of external constraints.

2.2. Studies involving creative products

Products, as objects of study have the advantage that they can be studied at leisure independently of the creative person himself. Although creative products are of value and interest in themselves, the crucial question remains: Can a product tell us anything about the personality of the individual who produced it? Is there a direct relation between what one does and the kind of person he is? (Welsh 1972).

Allport (1961) believed that the inference of personality from formal literary productions was not always warranted. According to King (1969) in the case of some contemporary poets, there is evidence that the better artists reveal less of themselves in their work than do the less gifted.

Until the product-personality equation has been solved, it seems prudent to utilize the former merely to identify the latter- as MacKinnon's (1962) research group has often done.

Wallach (1970) stated that an extensive literature has accumulated concerning the evaluation of products of research scientists. He pointed out that the bases for such evaluations has been varied, including such indices as occupational salary, number of publications, membership in various professional organizations, listing in such sources as Who's Who in America, output of potential inventions, and ratings by peers, supervisors, or panels of informed judges. He further commented that we may conclude from some of these works that the worth of scientific contributions seems to be relatively independent of traditional intellective assessment during the college years. Other studies in this field, however, have found relationships with customary intellective data.

Another problem of product-centered criteria is that they turned out to be relatively uncorrelated among themselves (Golann, 1963). Furthermore, one is considering primarily the achievements of mature adults, such product-oriented criteria cannot be applied in the assessment of children's creativity.

2.3. Studies focusing on creative processes

A third perspective in the study of creativity has been concerned with processes. It is on processes that research presuming to study creativity in children, adolescents, and young adults has concentrated

(Wallach 1970), and it will also be the focus of the present study. The question that concerns us here may be formulated as follows: Are there thinking processes (what we have in mind are the divergent thinking processes) that differ from those that form the basis for the general intelligence concept and that can be conceptualized as indicators of creativity?

It has been mentioned in the introduction that the major impetus to the search of thinking processes that seem to be related with creativity dates from the work of Guilford and his associates beginning in the early 1950s.

Whatever their limitations in studying creativity, products are at least are tangible and available for public scrutiny. Processes however, cannot be studied directly but must be inferred from other observations. Psychological processes in creativity, then, have an inherent intangibility.

Much of the studies on creative process are organized around the areas of thinking and problem solving.

Wallas (1926) conceived the creative process as consisting of four identifiable stages: preparation, incubation, illumination, and verification. Other studies concerned the report by the creative person himself based on his own introspections. Ghiselin (1955) edited the reports of 38 gifted men and women. A classic example is that of the famous French mathematician Henri Poincare, who stressed the role of the unconscious in the sudden illumination of solutions to baffling problems (1924).

The problem is that it is difficult to translate personal insights about the creative process into practical research techniques that can be applied in systematic studies of different groups of subjects (Welsh 1972).

2.4. Studies focusing on the motivational disposition

There has been a tendency to distinguish motivational aspects of behavior (as relatively more 'dynamic') from the 'structural' personality characteristics. The study of the former focuses more on concepts of need and drive, while the latter stresses the concept of trait.

Regarding the motivation of creativity, two quite different viewpoints have been expressed. One is negative in orientation and finds the source of creative behavior in hidden and unacceptable impulses; the other is positive and sees creativity as the natural outcome of the realization and expression of man's highest potentials. Most proponents of the first viewpoint have worked within a psychoanalytic framework. The second point of view is typified by Rogers (1959) and Maslow (1962).

Many other motivational factors have been proposed but most of them have received very little empirical support. Researchers holding The 'child-oriented' approach stress relaxation, playful meandering and lack of purpose. No active push, intention, motivation is involved in the tendency that leads a person toward creative functioning (Maddi, 1965).

2.5. Studies on time and place for creativity

This approach has been used in a both historical and geographical framework. Bronowski (1958) found two great peaks of creativity in Westers history: Greek culture between 600 and 300 B.C. and the Renaissance. Most studies however tend to use historical evidence rather than quantitative research for illustrative purposes. Klenz (1966) argued that the city as a working place leads to productive activity. According to others however, contemporary urban life has its inhibiting as well as its atimulating aspects (Hall, 1966).

Vernon (1973) pointed out that creativity is always relative to a particular culture and that 'there are very few who, like Shakespeare, appeal to something so universal in human nature as to retain their reputation over many generations and in diverse cultures' (p. 14). He and also Rogers (1954) stressed that the value of creative contributions is often not recognized at the time (e.g. the discoveries of Galileo and Copernicus). Some authors like Stein (1963) emphasized that to be regarded historically as representing creativity, the product must be acceptable to some group at some point of time. Termen (1947) recognized that for a given type of achievement to be possible one must be born not too far from a given time and place.

Other authors expressed a contrasting opinion that time and place may not be crucial at all. Maddi (1965) believed that the majority of significantly creative people would have been so regardless of the kind of environment in which they found themselves.

It is difficult to reconcile these contradictory views. Welsh (1970) commented that the historical approach, while of value for the general study of creativity, is not always directly or practically applicable to specific ongoing research problems.

3. DEFINITIONS OF CREATIVITY

One of the crucial problems in the study of creativity seems to be that there is not one uniformly accepted definition of creativity. In a number of reviews (e.g. Stein and Heinze, 1960; Getzels and Jackson, 1962; Barron, 1965; Golann, 1963; Taylor, 1964a, 1964b) the range of emphesis that can be embraced by the creativity term has been indicated. It does not seem possible to offer a simple, substantive definition of creativity that would win consensus. 'Rather', said Welsh (1972 p.231), 'we would merely be adding to the hundred-odd definitions previously analyzed by Irving A. Taylor (1959)'. Usually, creativity has been defined in terms of person, product, or process. It may also be defined in terms of personal and environmental conditions that 'press' an individuel toward creative behavior. Rhodes (1961) has referred to these four kinds of definitions as the '<u>Four P's of creativity</u>' (Person, Process, Press and Products). Stein (1963) in suggesting that creativity 'results in a novel work that is accepted as tenable or useful by a group at some point in time' emphasized the <u>environment (culture)</u> and the <u>time</u> perspective. Emphasis on the product is illustrated in Barron's (1965) definition: 'Creativity, may be defined, quite simply, as the ability to bring

something new into existence'. The production of something new is included in almost all the definitions given by those who investigated creative behavior. Thurstone (1952) however, argued that it does not make any difference whether society regards an idea as novel (as Stein insists). He maintained that an act is creative if the thinker reaches the solution in a sudden closure which necessarily implies some novelty for him. Stewart (1950) shares Thurstone's view, maintaining that productive thinking may occur even though the idea produced may have been produced by someone else at an earlier time. He pointed out that by this definition productive thinking may take place in the mind of the humblest workman (or in a little child, comment of author) as well as in the most distinguished statesman, artist, or scientist. Hulbeck's (1945) definition focused on the person: 'Creative action is an imposing of one's own whole personality on the environment in a unique and characteristic way'. The emphasis on the act of producing (process) rather then on the end result (product) is accepted today as central to the concept of creativity (Hurlock, 1972).

Definitions involving process, are among others those from Spearman (1930), who saw creative thinking basically as 'a process of seeing or creating relationships, with both conscious and subconscious processes operating', and from Torrance (1974) who operationally defined creativity as 'a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and

so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies: testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results' (p. 8). The seven verbal and three figural tests that make up the Torrance Battery are based on this description of the creative proces.

An analysis of the diverse ways of defining creativity will reveal that these definitions do not divide themselves neatly into the categories of 'person, process, product and press', but that they emphasize one or the other of these categories.
Torrance (1965) stated that it seems inevitable that a thorough understanding of creativity must involve the study of all four aspects of creativity. It is also obvious that an investigator must at any one time focus on one aspect and then on another, always being alert to the other three aspects of creativity. As Yamamoto (1964c) pointed out, there is no absolute need for everyone to agree on a single, universal meaning of 'creativity', but at least investigators should be clear about what they mean by this word. 'If we can get people to be precise about what they mean by creativity, we can learn to live with any discovered disagreement' (Sprecher, 1963, p. 77).

Choice of a research definition

For purposes of empirical research in the present study 'creative thinking' or 'creativity' is defined as a process that manifest itself in fluency, in flexibility as well as in originality of thinking.

Fluency is to be understood as the ability to come up with ideas rapidly, where the emphasis is on quantity and not on quality.
Flexibility is the ability to produce a great variety of ideas, with freedom from perseveration.
Originality refers to the ability to produce ideas that are statistically unique or unusual for the population of which the individual is a member.
These three aspects of creativity are the primary traits we attempt to measure in the present study.
With Guilford we define 'divergent thinking' or 'divergent production' as the generation of ideas from given information, where the emphasis is on variety of output from the same cource. Thus 'creativity' is operationalized in the divergent thinking measures.
Intelligence, on the other hand, operationalized in the convergent thinking measures, is the ability to arrive at single-type correct solutions to stated problems.
Short-term memory refers to tasks requiring retention for a short time, up to a minute or so.
Covergent thinking and short-term memory are the other cognitive functions, the relationships of which with the creativity (divergent thinking) measures will be determined in this study.

Creativity has been conceptualized in terms of the mental abilities involved in creative achievement; we have chosen for a 'process' definition as focus of the study, but the other perspectives under

which creativity can be studied will at the same time be considered as object of investigation.

Non-aptitude traits of the person which might be related to creativity will be assessed by means of an attitude-scale to be developed.

A creative 'product' as manifested in the writing of a composition where the emphasis is on the creative aspects in writing will be related to the scores for the various divergent thinking measures.

And finally, some personal and environmental factors (press) and their relationships with the creativity measures will be studied.

In highlighting creativity from different perspectives we hope to arrive at a more comprehensive picture of the topic under study.

4. REVIEW OF CREATIVITY RESEARCH

4.1. The work of the Guilford group

The Structure of Intellect model (SI model). In 1956 Guilford presented his SI model with reasons for the need of a morphological type of model to classify the intellectual abilities as found by factor analysis and to find relations among them. He started by classifying possible kinds of ability under three heads.

Abilities may vary according to:

a) the basic psychological processes or the kinds of operation involved, which are cognition, memory, divergent production, convergent production and evaluation (operation categories)

b) the kind of material or content involved, such as figural, symbolic or semantic (the content categories). Later he added a fourth kind of content, the behavioral (Guilford 1959)

c) the product categories, the forms that information takes in the course of being processed, such as units, classes, relations, systems, transformations and implications.

Operation, content and product became three parameters of a three-dimensional model. Thus the SI model classifies the abilities in three different ways, and the categories of one way intersect with those of the other ways of classification. By putting all three classifications together in one cross-classification we obtain the model shown in figure II-1. With five operation categories, four content categories and six product categories, altogether there are 120 combinations, and theoretically 120 unique abilities. An ability in any cell is unique by virtue of its own combination of one kind of operation, one kind of content, and one kind of product.

Definitions of the SI categories

The following definitions of the SI categories, of the three parameters and of intellect and intelligence were given(Guilford & Hoepfner, 1971 p. 17-21).

Intellect: the information-processing aspect of the living organism, where 'information' is that which organisms discriminate.

Intelligence: the level of goodness of individual intellectual functioning, which implies gradients of values and measurement.

Operation: Major kind of intellectual activity or process; something that the organism does with information.

Cognition (C): Immediate discovery, awareness, rediscovery, or recognition of information in its various forms; comprehension or understanding.

Memory (M): Fixation of newly gained information in storage.

Divergent production (D): Generation of logical alternatives from given information, where the emphasis is on variety, quantity and relevance from the same source.

Convergent production (N): Generation of logical conclusions from given information, where emphasis is upon achieving unique or conventionally best outcome.

Evaluation (E): Comparison of items of information in terms of variables and making judgments concerning criterion satisfaction.

Contents: Broad, substantive, basic kinds of areas of information

Figural (F): Pertaining to information in concrete form, as perceived or as recalled in the form of images. The term 'figural' implies figure-ground perceptual organization.

Symbolic (S): Pertaining to information in the form of denotative signs having no significance in and of themselves.

Semantic (M): Pertaining to information in the form of conceptions or mental constructs to which words are often applied, hence most notable in verbal thinking and verbal communication, but not necessarily dependent upon words.

Behavioral (B): Pertaining to information, essentially non-figural and non-verbal, involved in human interactions.

Product: Basic forms that information takes in the organism's processing of it.

Units (U): Relatively segregated or circumscribed items of information having 'thing' character.

Classes (C): Conceptions underlying sets of items of information grouped by virtue of their common properties.

Relations (R): Connections between items of information based upon variablesor points of contact that apply to them.

Systems (S): Organized or structured aggregates of items of information; complexes of interrelated or interacting parts.

Transformations (T): Changes of various kinds in existing information

Implications (I): Circumstantial connections between items of information, as by virtue or contiguity, or any condition that promotes 'belongingness'.

According to Guilford (1962) creativity in its narrow sense, refers to the abilities that are most characteristic of creative people. Creative abilities (traits) determine whether the individual has the power to exhibit creative behavior to a noteworthy degree. Whether or not the individual who has the requisite abilities will actually produce results of a creative nature will depend upon his motivational and temperamental traits.

Guilford (1962) defined an individual's personality as his unique pattern of traits. A trait is any relatively enduring way in which persons differ frome one another. Creative personality is then a matter of those pattern of traits that are characteristic of creative persons.

Behavior traits come under the broad categories of aptitudes, interests, attitudes, and temperamental qualities.

Aptitude refers to a person's readiness to learn to do certain types of things; it could be brought about through hereditary or through environmental determination; usually, by an interaction of the two. By attitude we mean his tendency to favor or not to favor some type of object or situation. Interest is a person's inclination or urge to engage in some type of activity. Temperamental qualities describe a person's general emotional disposition.

In the Aptitudes Project attention has been given to the extent that non-aptitude traits might contribute to creative thinking. Scores for these non-aptitude variebles as assessed by various self-

inventories were correlated with scores for performance on tests of fluency, flexibility and originality. The correlations were all below ,30, but statistically significant correlations were found for the following non-aptitude traits of creativity (1959): need for adventure, tolerance of ambiguity, impulsive, self-confidence, appreciation of creativity and of esthetic expression, reflective thinking, and strong need for variety. Traits of rigidity contra-indicated flexibility of thinking. The unoriginal person tends to be more meticulous and to feel a need for discipline.

Primary aptitude traits related to creativity

Regarding the primary aptitude traits of creativity some hypotheses were adopted by Guilford et al for investigation in 1950.
It was hypothesized that fluency of thinking would be an important aspect of creativity. Four fluency factors were identified:

1. Word fluency, first reported by Thurstone (1938): the ability to produce words each containing a specified letter or combination of letters. Guilford commented on word fluency that it is not easy to see where this ability would have much importance in creative work in everyday life, but Drevdahl (1956) has found it to be related in both science and arts students.
   The Creativity Battery in the present study include a measure of this factor (see Chapter IV).
2. Associational fluency is the ability to list words that bear some relation to a given word, e.g. naming synonyms.

3. Expressional fluency is the ability to put words into organized phrases and sentences. A measure of this type of fluency has been included in our battery (see chapter IV).
4. Ideational fluency is the ability to list rapidly ideas that meet meaningful requirements. In any test of ideational fluency, speed is important and quality does not matter. Guilford mentioned (1959) that Winston Churchill must have had this ability to a high degree. No matter what problem came up, Churchill always seemed to have about ten ideas. We included measures of this factor in the Creativity Battery, to be contrasted to measures of word- and expressional fluency, both of which are related to word productivity.

It was also predicted that creative thinkers are flexible in thinking, flexibility referring to the ability to vary one's ideas over a wide range.

The Guilford group found two flexibility factors, spontaneous and adaptive flexibility. The difference between 'spontaneous' and 'adaptive' flexibility is that in the first case the thinker is flexible even when he has no need to be, whereas in the second case he would fail to solve a problem if he were not flexible (Guilford 1959).

A measure of spontaneous flexibility was included in our Creativity Battery.(see chapter IV).

Another aspect that certainly could be expected in the area of creativity is originality. With originality (as contrasted to

fluency) some standard of quality has to be defined for acceptable responses.

Guilford stated that there are three ways to indicate the degree of originality:

1. One principle of measurement is unusualness of responses in a statistical sense. We adopted this criterion of originality (see chapter IV) in our study.
2. Originality is also indicated by remoteness of associations or relationships. In Mednick's (1961) Remote Associates Test (RAT), each item gives the examinee three common words to which he is to respond by giving a single word that is associated with each of them.
3. A third way of measuring originality is in terms of cleverness of response. In the Plot Titles Test a short story is presented, the examinee being told to list as many titles as he can to head the story. In scoring the test, the responses are judged according to cleverness of response.

It was felt that these 3 definitions include significant aspect of what is commonly meant by the term 'originality'.

Elaboration was predicted and found as being an aspect of creativity. It has been identified as the ability to develop one's ideas and to spell out the detail. Our battery provides a measure of this trait (see chapter IV).

Sensitivity to problems was another trait supported by factorial studies. It is the ability to be aware of problems, seeing defects or deficiencies in common devices such as the telephone, the refrigerator etc.

This factor is placed in the evaluation category of the SI model, evaluation in terms of being sensitive to errors or shortcomings. We did not include this factor in the Creativity battery which focused on the divergent production category.

Another primary trait of creativity, Redefinition, called for the ability to give up old interpretations of familiar objects in order to use them or parts of them in some new way ('Gestalt Transformations', Guilford, 1959). In the SI model it is classified in the convergent production category, for which the kind of product is that of transformation, a reason for not including this type of test in the present study.

Not all of the hypothesized traits of creativity have been identified by factor analysis. The ability to analyze and to synthesize were predicted as separate factors, but factor analysis has not detected these abilities as such.

Other factors contributing to creative performance

It has been stressed by Guilford (1971) that although the most obviously creative abilities are in the category of divergent thinking, not all creative performance is accounted for in terms of operations

of divergent production. Other abilities outside the divergent thinking category also make significant contributions to creative productivity, e.g. sensitivity to problems and redefinition. Subsequent analyses of Mednick's Remotes Associates Test have consistently shown that it is more strongly related to the convergent than to the divergent production of semantic relations.

Guilford emphasized that most of the abilities in the structure of intellect may play a role in the complete operation of invention. The cognition of information is basic, without this ability there is no intellectual performance of any kind. Further, learned information is of no value later unless it is retained (role of memory). Generating many unusual ideas (divergent production) is crucial in the creative process, but evaluative abilities are also needed to allow any self-criticism.

4.2. The study of Getzels & Jackson

The almost classical study of Getzels & Jackson (1962) concerned a group of 449 adolescents of a private secondary school ranging from the sixth grade to the senior year of high school. From this sample two subgroups were contrasted:

- the high-creativity group (N = 26): these were subjects in the top 20% on five creativity measures (taken or adapted from either Guilford or Cattell, or constructed especially for the study), when compared with peers of the same sex and age, but below the top 20% on an I.Q. measure (either a Binet or Wechsler Intelligence Scale for children).
- the high-intelligence group (N = 28)

were subjects in the top 20% in I.Q. when compared with peers of the same sex and age but below the top 20% on the creativity measures. It was found that a) despite the similarity in I.Q. between the high creatives and the average score of the schoolpopulation, and b) the 23 point difference in mean I.Q. between the high I.Q.'s and the high creatives, the achievement scores of the two experimental groups were equally superior to the achievement scores of the schoolpopulation as a whole.

Perception by teachers. Another interesting finding was that when teachers were asked to rate all students on the degree to which they enjoy having them in class, the high I.Q. group stands out as being more desirable than the average student, the high creative does not. Even though they do not differ in academic performance, as measured by achievement tests, the high I.Q. student is preferred over the average student, whereas the high creative does not.

Motivation for achievement. Using McClelland's need achievement measure, no differences were found between the high creatives, the high I.Q.'s and the total school population. General cognitive style and general motivational structure are inextricably related and can be separated only for analytic purposes.

Getzels and Jackson concluded that present measures of intellectual functioning sample only a small portion of a person's intellectual resources.

If we are to encourage divergent thinking as well as convergent thinking, reward discovery as well as memory, we need achievement tests that are appropriate to these outcomes.

In this connection Bentley's study, as cited by Kogan (1967) may be mentioned. Bentley found the following set of correlation coefficients for four different measures of achievement in a graduate class of 110 students in educational psychology and a composite measure of creative thinking ability based on a battery of the Minnesota tests and the Miller Analogies Test, an instrument commonly used in graduate school admission procedures:

Achievement measure	Creativity	Miller Analogies
Recognition (multiple-choice test)	.03	.47
Memory (completion and short-answer test)	.11	.41
Productive thinking (creative applications)	.53	.37
Evaluation and judgment (decision making)	.38	.27

What can be inferred from this study is, that when knowledge is obtained in the classical, often authoritarian fashion, a measure of mental age or intelligence is a better predictor of achievement than measures of originality, fluency and the like. But when knowledge is obtained in creative ways, for example by discovery or experimentation, the measures of originality, fluency and the like seem to be better predictors than scores on intelligence tests.

4.3. The study of Torrance

Following the same pattern of Getzels & Jackson in their study of high school students, Torrance (1959) obtained essentially the same results in the early school years. He was also interested in determining the extent to which a group of gifted children identified on the basis of traditional I.Q. measures would include creative children if I.Q. alone were used in identifying giftedness. The results indicated that, no matter what measure of I.Q. is chosen, about 70% of the most creative children would have been excluded, if I.Q. alone were used in identifying giftedness.

Sample	Intelligence Test	% of the 20% most creative children excluded
1. N = 150	WISC	70%
2. N = 375	Otis Quick Scoring Test of Intell.	73%
3. N = 335	California Test of Mental Maturity Metropolitan Test of Readiness	70%
4. N = 485	I.Q. based on Buck's H.T.P. Test	63%

With a difference of 25.6 I.Q. points on the Wechsler Intelligence Scale for children between the highly intelligence group and the highly creative group, there were no statistically significant differences in achievement as measured by the Iowa Achievement Battery and the Gates Reading Test. The Torrance Tests of Creative Thinking consisted of four verbal tests: Ask-and-Guess, Product-

Improvement, Unusual Uses and Just Suppose, and three figural tasks: Picture Construction, Incomplete Figures and Repeated Figures.
For comparison purposes, a third group consisting of those high on both I.Q. and creativity, was added, to the two experimental groups.
In general, the high I.Q. lower-creativity pupils tend to be preferred by teachers to those high on both I.Q. and creativity.
Those high on both were judged by teachers as more unruly, more dominant, more ambitious, more independent, more friendly, and more studious and hardworking than either of the other two groups. On the basis of teacher nominations, those high on both measures tend to be more frequently named as most talkative, quickest to think of an idea if something goes wrong with plans, having unusual but sound ideas, and getting attention from peers for their ideas.

In Yamamoto's study (1964a), 48% of those in the upper 20% on creativity would have been excluded, if I.Q. alone had been used as the basis for identifying 'giftedness'. His findings supported the results of previous studies of Getzels and Jackson (1962) and Torrance (1959).

4.4. Wallach and Kogan's (1965) studies differed from Guilford's work in that the test procedures were administered under relaxed non-test conditions free from time pressure, in contrast to the time limits and testing context prevailing in the work carried out within the Guilford tradition. The sample consisted of 151 fifth grade children from a public school. The tests were individually administered, after

an initial period of two weeks in which the testers, who were introduced as visitors interested in children's games, gained rapport with the children. The average correlation among the creativity measures was .41, whereas the average correlation between the divergent thinking and the convergent thinking measures was as low as .09 for the total sample. The average correlation among the convergent thinking measures was .51. Based on these results Wallach and Kogan concluded that a dimension of individual differences has been identified that is cohesive in itself but independent from the general intelligence concept.

However, a study by Kogan and Morgan (1969) failed to replicate Dentler and Mackler's (1964) finding, that children taking creativity tests under relaxed conditions produced significantly higher creativity scores than under test-like conditions. Kogan and Morgan found no significant differences in creativity, when fifth grade subjects were given two creativity tests (of the same type as was used by Wallach & Kogan) under test- and game-like conditions.

According to Guilford (1971), any game atmosphere might have been counteracted by the condition of individual testing with the tester present and taking notes. The relative anonymity in the group test situation may be more relaxing. Under that condition there is at least no face-to-face encounter and opportunity for immediate, external evaluation.

The factor that Wallach & Kogan's composite score has almost no cor-

relation with tests of intelligence does not justify the conclusion that it measures anything creative. Some non-aptitude variables, e.g. persistence or resistence to boredom may well account for their findings. According to Guilford time limits are needed as one way of controlling conditions.

Christenson and Guilford (1963) experimented to see what effect the time variables would have on measurement of the test's dominant factor of associational fluency. The result was that the scores based on the performance during the first two minutes were found to be distinctly better measurs of the factor in question then those during the last three minutes.

4.5. The dimensionality question

Since the rapid upsurge of research on creativity in 1950, a controversial issue has been the dimensionality question, or in measurement terms, the problem of discriminant validation(see Campbell and Fiske, 1967). It involves the degree to which measures of creativity or divergent thinking are empirically distinguishable from other more traditional measures of intelligence. While a great number of studies were able to demonstrate that a high I.Q. does not imply high creativity, other studies showed that creativity test scores correlate almost as highly with intelligence test scores as with each other. The same conclusion emerges from studies reporting simple intercorrelations, those employing more refined factor-analytic techniques, and those comparing mean scores of subgroups(Anastasi & Schaefer, 1971).

Depending on the size and the heterogeneity of the samples involved, intelligence-creativity correlations have ranged from .18 to .55 (Wade, 1968). The investigations of Getzels and Jackson (1958), Torrance (1959) and of Yamamoto (1964d)have suggested that there is little relationship between creative thinking abilities and the abilities measured by intelligence tests. However, these investigations have been limited to the study of individuals with relatively high I.Q.'s.

Besides, the Getzels & Jackson results showed that the five creativity tasks that have been used were no more strongly correlated among themselves than with intelligence. For boys the mean correlation between the creativity battery and I.Q. was .26 and the mean inter-correlation among the creativity tasks was .28; in the case of girls the corresponding mean correlations were .27 and .32.

Ripple & May (1962) demonstrated the caution necessary in expressing the relationship between I.Q. and creativity. They identified four groups in their study:

- low homogeneous with I.Q.'s ranging from 72 to 90,
- average homogeneous with I.Q.'s ranging from 96 to 110,
- high homogeneous with I.Q. ranging from 116-133 and a
- heterogeneous group, identified byselecting subjects from each of the homogeneous groups.

These four groups had been administered the Otis Quick Scoring Mental Ability Test and nine tests of creative thinking. Product-

moment correlations between I.Q.'s and creative thinking scores were computed separately for each of the four groups. It appeared that the correlations were considerably smaller in the homogeneous groups than in the heterogeneous group. They concluded that the low correlations between I.Q. and creativity reported by other investigators may well be due in part to the restricted I.Q. ranges in their samples.

4.6. Trait consistency

Related to the dimensionality question is the question of trait consistency across creativity measures. This concerns:

- the relationships between trait measures within individual tests (e.g. in 'Unusual Uses' the correlations between the fluency, the flexibility and the originality score),
- the relationships within traits but across tests (e.g. the degree to which fluency scores on Word Beginnings are correlated with fluency scores on each of the other verbal subtests).

There is not much evidence dealing explicitly with the relationship between various creativity subtests. Torrance (1974) presented only the intercorrelation between total fluency, flexibility, originality, and elaboration scores in his testing manual. In the studies of Harvey, Hoffmeister, Coats, and White (1970), correlations were run between trait measures (fluency, flexibility, and originality) within individual tests and also within-traits but across tests. The mean correlation between traits was .54, but the mean within-

trait correlation was only .27. The highest degree of intercorrelation occured between the fluency scores obtained from the various subtests. In Crockenberg's study (1971) the within-trait correlations were somewhat higher. Among fluency scores across seven verbal subtests, the average correlation was .42; among flexibility scores .32; among originality scores .28; among elaboration scores .38.

Long and Henderson (1964) and Cicirelli (1964) found the lowest correlations between elaboration and each of the other three measures (fluency, flexibility and originality). The correlations between fluency, flexibility and originality were considerably higher.

4.7. The 'threshold of intelligence'

The interesting concept of 'threschold of intelligence' was first proposed by Anderson (1960) and further explored by Torrance (1962b), Yamamoto (1965a) and Guilford at al (1966). According to Anderson (1960):

> 'We can think of ability level in terms of thresholds and ask questions as to the amount necessary to carry on a task and then consider the factors that determine functions beyond this threshold .... There are cut-off points or levels above which the demonstration of ability in relation to environmental demands is determined by the presence of other factors. In other words, creative thinking abilities might show their really differential effects only beyond a certain minimum level of intelligence' (p. 25).

That personal factors and not intellectual may be crucial has been stressed by Cox (1926), Roe (1952) and MacKinnon (1962a). According to MacKinnon (1962b):

> '.... if a person has the minimum of intelligence required for mastery of a field of knowledge, whether he performs creatively or banally in that field will be crucially determined by non-intellectual factors' (p. 493)

There is substantial evidence that there might be a threshold of intelligence above which there is little relationship between I.Q. and creativity. In Yamamoto's (1965b) study, correlations between I.Q. and creativity scores decreased in size as I.Q. increased. The correlation between I.Q. and creativity scores for the group with I.Q.'s below 90 was .88 after correction, and for the 90-110 I.Q. group, .69. However, in the 110-130 I.Q. group, the correlation between I.Q. and creativity scores dropped to .30.

Similarly, Torrance (1962b) reported that the correlations of creativity scores with I.Q. was .50 for children with I.Q. scores below 120, but only .20 for children with I.Q. scores above 120.

Each of these findings is consistent with MacKinnon's (1966) conclusions based on his work with creative writers, architects, research workers, and mathematicians, that

> 'a certain degree of intelligence, and in general a rather high degree, is required for creativity, but above that point the degree of intelligence (at least as intelligence is measured by intelligence tests) does not seem to determine the level of one's creativeness' (p. 153).

With two subgroups - a high-creative group, a group in the upper 20% on a test of creative thinking, and a low-creative group, those in the lower 20% on the same test - Yamamoto (1964) investigated the role that creative thinking plays in school achievement, by partialling

out the effects of intelligence. It was found that the high-creativity group performed significantly better than the low-creativity group on all of the subtests of an achievement battery. Torrance (1959) obtained the same results.

Wallach (1970) and others explain this decrease in relationship between I.Q. and creativity scores as I.Q. increases in terms of the restricted distribution of I.Q. scores in the samples under study. Other investigations however contradict Wallach's argument.
In Crockenberg's study (1971) using a sample of 49 children from a school for gifted children, I.Q. scores ranged from 97 to 156 on the WISC (mean I.Q. : 137; s.d.: 13.14). Thus the range of I.Q. scores was considerably broader than that of other studies. Yet correlations between I.Q. and Torrance Tests of Creative Thinking ranged from -.15 to .09.
It seems inevitable that more studies should be conducted to clarify this matter.

4.8. Age related differences in creativity

Turning to research on age differences, the general finding has been an increase with age across the elementary and high school years in performance level on the Torrance tests (e.g. Torrance, 1964; Yamamoto, 1962; Lembright and Yamamoto, 1965, cited by Wallach, 1970). This can be expected, since the increase in amount of stored information with increase in age should have some effect upon the production of ideas. On the other hand, age-related increases have not been invariably obtained.

Andrews (1930) observed one peak in development to be reached approximately at age four-and-a-half. A sudden drop at age five, when the child enters kindergarten, is followed by increases in the first, second, and third grades. At age nine, near the end of the third grade or at the beginning of the fourth, there is a rather severe decrement in almost all of the creative thinking abilities. Then comes a period of recovery especially for girls in the fifth grade. This recovery is primarily in fluency and not in originality. The recovery in originality comes largely in the sixth grade. After this there is another decrease between the sixth and seven grades (Torrance, 1964).

Davidon and Longo (1960) found no increase in number of unique responses produced in a free associating task to various stimuli across an age range extending from fourth graders to college freshmen and sophomores. Davidon and Longo were led to conclude from their evidence that 'the diversity of associations is not a simple function of the number of different experiences or of developing verbal ability' (1960, p.91). Such findings lead us back to the need for creativity research related to age respectively developmental levels. The shape of the developmental curve may differ from culture to culture.

4.9. Socio-cultural conditions and the development of creativity

Stein (1959) pointed out that the prediction of creativity involves two basic problems:

a. a better understanding of the psychological criteria of creativity and

b. a better understanding of the environment, 'because creative behavior, as all other forms of human behavior, is a function of the transactional relationships between the individual and his environment'.

Although creativity has drawn a great deal of attention from psychology, education, industry and governmental agencies in the last two decades, yet the topic has hardly been studied at all in its social and cultural contexts. According to Mar'i (1976):

> 'Only after we have determined the environmental, cultural, and social conditions that block the creative potential of individuals, and other conditions that are conducive to the developments of these talents can we achieve the universal goal of modern education: the development of the learners' creative talents' (p. 108).

Societies differ in their attitudes toward innovation and, as Torrance (1965) has already demonstrated, creativity suffers in cultures that do not appreciate creative people. He found significant correlations between the values placed on creativity and the creative performance of schoolchildren.

The studies of Getzels & Jackson (1962), Torrance (1965) and Bachtold (1974) reported incongruence between educators' concepts of ideal behaviors of children and behaviors which were found to be characteristic of creative persons. Considering that teachers and parents both consciously and unconsciously reward behaviors in terms of their

own ideals, concern was expressed over the development of creative abilities (Bachtold, 1974). The crucial question that interests us is: to what extent do behavioral goals for children, as conceptualized by teachers and parents, reflect 'the creative personality'? To what extent is creativity rewarded in a culture? What opportunities does a culture provide for their members to express themselves creatively? Especially in developing countries, where people are still confined by the narrow limits of their traditions, and where they often are preoccupied with obtaining their basic physical needs (Mead, 1959); can we expect such persons to be creative, if they lack the leisure time to think and are not free from the urgent demands of everyday life? According to Maslow (1954) only when his basic needs are satisfied can a person strive to actualize higher levels of his selfhood.

A society often 'discriminates' against certain classes or categories of people. Women, for example, usually have fewer opportunities to express their creativity than men. Mar'i(1976) found that in the Israeli-Arab society, girls fall significantly behind boys on all creative measures. Radina (1969) found similar differences in India. This is not only true in Asian-African countries. Torrance (1965) found that at most ages, girls fall behind boys in their creative performance in the classroom. It would be very interesting to find out how Indonesian girls compare with boys. In the National Assessment report (1976) it has been stated that 'surprisingly',

there were no differences in school achievement between the sexes, in any subject.

It has also been found that children from middle socioeconomic status scored significantly higher on measures of creativity than those from low socioeconomic status (Check, 1970; in Mar'i, 1976).

With regard to parental control patterns, Getzels & Jackson (1962) found that creative adolescents came from permissive families that emphasized the independence and initiative of their children. Weisberg and Springer (1961) found a positive relationship between a child's tested creativity and father's occupational autonomy. MacKinnon's (1965) architects came from families where there was a plentiful supply of successful and respected relatives as suitable models of identification. He also characterized the parents of future creative architects as having an extraordinary respect for the child and confidence in his ability to do what was appropriate. They did not hesitate to grant him freedom in exploring and in making decisions for himself. A majority of MacKinnon's non effective group had mothers who were demanding and overprotective. A similar finding is reported by Drevdahl (1964).

Bartlett and Smith (1966) report that the need for achievement in a sample of thirty- one boys aged eight to ten appeared to be related to the frequency with which mothers expressed disappointment with unsatisfactory behavior and the infrequency with which expressions of love were used as rewards.

With regard to school progress, Oden (1968) who reported on Terman's follow up studies on gifted children, found that fifty-nine percent of the successful group were encouraged to forge ahead while only thirty-nine percent of the non-achieving group were so encouraged. Fifteen percent of the parents of the achieving group demanded high marks, three times as many as in the other group.

Birth order and family size related to creativity and eminence have also been the subject of numerous studies. MacKinnon (1965) reports that his group of highly effective individuals had more than an average number of siblings with whom they were more friendly than usual. Roe (1952) notes a greater than chance incidence of first-born children among her sample of sixty-four outstanding scientists.

It has been argued that the framework in a modern society is wide and flexible and offers a variety of areas into which creative talents can be directed, while the traditional society provides a very small and rigidly defined framework for the creativity of its members (Mar'i, 1976).

This problem constitutes certainly an interesting field for further research and analysis.

5. THE CRITERION PROBLEM IN CREATIVITY VALIDATION

5.1. Ultimate, intermediate or immediate criteria

Most authors agree that the question of whether or not some measure of creativity 'really' taps something that is genuinely

'creativity' is probably the foremost concern of the researcher. After more than twenty years of intensive research little progress has been made on achieving acceptible cirteria for creativity. In the words of Taylor & Holland (1964), 'there is no more crucial problem' (p. 31). One of the reasons is of course the afore mentioned lack of uniformity in the definition of creativity and the lack of a general accepted theoretical framework in the area of creativity.

One of the problems in creativity validation studies with respect to children is the choice between ultimate, intermediate of immediate criteria of creativity (distinction by Thorndike, 1949). An ultimate criterion of creative performance is based on the total output of an individual, but this can be only evaluated at the end of a person's life. At least in the case of children it requires longitudinal studies such as Terman's (1947) work. Apart from the need to conduct long term studies of creative development, the tremendous timelag and great expense render such procedures impractical.

However, establishing criteria for concurrent validity measures has also been difficult, as pointed out by Treffinger & Poiggo (1972), 'because of disagreement over a variety of specific issues, the evaluation of products, the possibility of determining process creiteria, the question of novelty (For whom?), ... much more must be known about the effects of a variety of control variables. Are different criteria needed for sexes, various age groups, or in different cultural settings?' (p. 256).

5.2. Predictive and Construct Validity

Cronbach & Meehl (1955), Anastasi (1976) and others, conform the Standards for Educational and Psychological Tests (1974), classify validity studies into: predictive validity, concurrent validity, content validity, and construct validity, where the first two may be considered together as criterion- oriented validation procedures. Drenth (1975) on the other hand made only a distinction between 'predictive validity' which primarily concerns the prediction of behavior or performance outside the testsituation (the term 'prediction' being conceived broadly in a methodological rather than in a temporal sense, involving prediction of future, of present - paradiction - and of past behavior - postdiction) and 'construct validity' which primarily concerns the attribute, trait or personality factor, underlying the test score or test result.

The problem faced by the investigator is, 'What constructs account for variance in test performance?'

Drenth departs from Cronbach & Meehl and from Anastasi who conceive predictive validity as 'criterion- oriented' validity. According to Drenth, validation is always empirical and validity always concerns the relation between the test and a criterion. Whether to predict performance or behavior (predictive validity) or to gain insight into the psychological meaning of the test behavior (construct validity), the behavior to be predicted as well as the hypothetical construct underlying the test behavior, need to be operationalized in a measurable criterion, to be compared with the test results.

The difference between predictive validity and construct validity

lies in the role of the criterion: in predictive validity it has its aim in itself, while in construct validity the criterion has sense as a reflection of a hypothetical concept (Drenth, 1975).

Drenth pointed out some limitations of the predictive validity concept, especially in its extreme sense, as is often the case in practice, where it becomes not important what the test measures, but merely whether the test can predict an adopted criterion. Whether the relation between test and criterion behavior is psychological meaningful is not of primary importance, as long as there is a correlation between the two. According to Albright, Glennon & Smith (1963, cited by Drenth, 1975), the question as to the why of the relationship is more an academical matter, than a practical problem. In this sense, as Drenth argues, predictive validity does not lead to scientific insight, nor to progressive scientific thinking. Construct validity on the other hand is scientifically important, in that the value of a test is determined by its relevance of meaning, thus making a contribution to psychological theory formation.

Construct validation takes place when the investigator tries to prove that his instrument reflects a particular construct, The psychological meaning of a construct is given by a network of associations or propositions in which it occurs (the nomological network). Whether or not the test truly reflects this theoretical construct has to be proven empirically, by testing predictions on the relationship of the test with other operational deductions from the theoretical construct (criteria).

In the early history of a construct the network will be limited, the

construct having only a few connections, but with progressing research, adding new observations and new components, the network will become more elaborated and more refined.

We cite Cronbach & Meehl:

> 'We start with a vague concept which we associate with certain observations. We then discover empirically that these observations covary with some other observation which possesses greater reliability or is more intimately correlated with relevant experimental changes than is the original measure, or both' (1955, p. 286).

This whole process of conceptual enrichment of the psychological meaning of the test in which a number of specific criteria are used and in which the test more and more gets a 'surplus-meaning' above the operational level with which the process often has started, is referred as the 'bootstraps' process (Cronbach & Meehl, 1955; Drenth, 1975). An illustrious example is the development of the Binet scale and the definition of intelligence.

For the justification of a conceptual framework, or for the establishment of construct validity, discriminant as well as convergent validation is required (Campbell & Fiske, 1967). If two tests are presumed to measure the same construct, a substantial correlation between them is predicted (Convergent or confirmant validity).

Tests can be invalidated by too low correlations with other tests assumed to measure the same construct, or by too high correlations with other tests from which they were intended to differ (discriminant validity).

In our study we start with an operational definition of creativity in terms of the divergent thinking tests that have been used.

But, as has been indicated by the just mentioned course of thought, by interrelating this operationalized concept of creativity with other direct and indirect indicators of creativity and intelligence, we hope to enrich the meaning of the concept and to add a useful surplus-meaning to the test construct.

5.3. Multi-dimension and multi-criterion approach

MacPherson (1963), Taylor & Ellison (1964), Yamamoto (1965) and Guilford (1971) proposed a 'multi-dimensional' (McPherson) or 'multi-criterion' (Yamamoto) approach in the case of creativity validation. We cite Yamamoto (1965):

> 'Intercorrelations between creativity measures and other, more traditional measures of aptitudes, achievement, interests, values, beliefs, and personality should also be studied intensively to provide a larger and tighter nomological net around this concept of creative thinking' (p. 289).

Guilford (1971) warned of common misconceptions which must be avoided in studying creative talent. He observed that creativity has too often been associated only with 'divergent thinking', although he has argued strongly that many other aptitudes are involved. And:

> 'Since creative talent is composed of numerous special abilities, and since criteria of creative performance in everyday life are also complex, no one test of a creative ability can be expected to correlate highly with those criteria' (p. 86).

Failure of tests in the creativity area to correlate substantially with a criterion of creative performance can occur for a number of reasons (Guilford 1971):

- an inappropriate criterion
- a poor selection of abilities to be tested, or
- low reliabilities of criteria or of tests or of both

For example, in Beittel's (1960) study, divergent production tests from the semantic content category correlated most insigficantly with a criterion of creative performance of college art students (inappropriate criterion). On the other hand, a visual figural test in the cognition category did correlate .40 with the criterion.

5.4. Teacher nominations as criterion

Teacher nominations have been used to a large extent in validation studies as indirect criteria, although many authors doubt the usefulness of teacher ratings. Holland (1959) pointed out the limitations of teacher ratings as predictors of creativity. To his opinion, teacher ratings are potentially more useful as predictors of academic achievement. Nevertheless in studies of creative thinking, ratings by teachers would seem to be able to distinguish between the creative and the less creative pupils, if the teachers are asked to nominate them on specific criteria such as 'coming up with most ideas' (fluency), 'finding a new way of meeting problems' (flexibility) etc.

Yamamoto (1963) reported that, among fifth grade children, those nominated by teachers obtained significantly (.05 level) higher means than non-nominated ones on creativity scores.

Guilford (1971) found that in normal classroom conditions, teachers tend to be poor evaluators of creative qualities. They seem to do better in the rating of observed products, such as drawings and writings, as was shown in the study of Jones (1960).

Again, until it becomes clear that judges are rating the same traits using the same frame of reference, subjective ratings should not be used exclusively as criteria.

5.5. School performance as criterion

In empirical validation studies, school performance, -e.g. grade point average or standardized school achievement tests-, have often been used as criteria for creativity tests, in studies in which one was interested in the relationship between creativity and school performance. The study of Cline, Richards and Abe (1962) involving 161 high school students was conducted to evaluate the degree to which academic performance can be predicted from a battery of creativity tests.

The following creativity tests constituted the predictor variables: Consequences, Word Association, Hidden Figures, Brick Uses, and Match Problems. An intelligence measure was based on the California Mental Maturity Inventory. Grade point average was obtained from the school records. The results indicate that the creativity tests do have considerable validity as predictors of academic performance, and that the criterion variance accounted for by the creativity tests is to a substantial degree independent of the variance accounted for by the I.Q. test.

Similar other studies concerning the relative power of creativity and intelligence in predicting academic achievement have been conducted (Getzels & Jackson, 1962; Torrance, 1959; Yamamoto, 1964d; Wade, 1968). The common finding regarding the prediction of achievement is almost equal predictive power for creativity and intelligence, as measured by whatever tests.

Interesting is Wade's finding (1968) that the combination of intelligence and creativity explains almost twice as much of the achievement variance as intelligence alone, and nearly thirty perdent more than

the three creativity tests combined. The studies by Cline et al (1962) on the other hand show that a combination of creativity and intelligence predict school achievement no more efficiently than either one separatedly.

Guilford (1956) in his factor analytic validation studies with course grades as criteria, commented that the observed variability of validity coefficients, varying from institution to institution, curriculum to curriculum, and criterion to criterion, could, at least partially, be attributed to differences in policies and practices in teaching, examination procedures and other sampling 'error' sources.

Chapter III

THE INDONESIAN SCHOOL SYSTEM

Since Indonesia's Independence in 1945, various educational reforms have been established and are still under way. These concern the formal educational system, teaching-learning strategies as well as the curriculum content.

The most drastic change is without doubt the democratization of education. Indonesian education aims to provide equality of opportunity, regardless of race, social class or whealth. The tremendous increase of school enrolment however faces the Government with crucial problems, e.g. lack of educational facilities, lack of an inadequate trained teachers, high drop-out rate, lack of relevance of curriculum content with development and societal needs.

This chapter is an introduction into the existing educational system in Indonesia.

Firstly a description of the Indonesian population will be given, among others indicating that almost half of the population is non-productive, which means a heavy strain for the educational world.

Secondly, the formal school system after Indonesia's Independence will be presented, the growth of enrolment rate, the proportion of primary and junior secondary pupils (the present study deals with primary and junior secondary pupils), the ratio of the school age population and the number of schools, and the various types of schools.

In the third section the goal of national education will be briefly mentioned, from which it becomes clear that the development of creative

ability and of a creative attitude is deemed important by the Ministry of Education and Culture.

The fourth section is primarily concerned with the curriculum and the method of instruction. Various curricula changes over the years indicate that the Government is still striving at an improvement of the quality of education. As it now exists, emphasis on routine skills and rote memorization still characterize the educational pattern at the primary as well as at the junior secondary schools.

The fifth section discusses problems with regard to quantity and quality of Indonesian teachers. It has been found that neither type nor level of diploma, neither salary nor position is a guarantee for effective teaching.

The final section stresses the need for educational evaluation and testing. The major areas for evaluation and testing will be discussed. At the same time some theoretical considerations will be put forward: the crucial problem whether to use psychological or achievement tests for selection purposes, the use of psychological tests to 'diagnose' the educational system, and the importance of creativity tests in addition to intelligence tests for selection purposes as well as for the identification of talent.

1. DESCRIPTION OF THE POPULATION

According to the Central Bureau of Statistics, in 1974 the population of Indonesia was 129.082.642, of which 63.625.288 were male and 65.457.354 were female. There are about 13.000 islands, 6000 are inhabited, but the density of the population is not equally distributed over the islands. 64.2% live in Java and Sumatra, 17.6% in Sumatra, 7.2% in Sulawesi, 4.4% in Kalimantan, and 6.6% on the other islands.

The average population density, overall (national): 63 per km^2

Java : 565 per km^2

The annual birthrate is between 2.6 and 2.9%. Almost 80% of the inhabitants live in rural areas, where agriculture is the principle means of subsistence.

A great percentage of the population consists of young people. It was estimated that in 1971, more than two out of three persons were under thirty years of age.

In 1974 the non-productive population (0-14 years) was 58.217.248, or 44.41%. In other words, almost half of the Indonesian population cannot be expected to contribute to the nation's welfare and its economic development.

Both the absolute growth in the population and the high share of youth in the total, present a number of development dilemmas. The high proportion of persons under 20 years of age will result in a heavy strain on the nation's ability to supply basic social services, particularly in the field of education (Office of Educational and

Cultural Research and Development, 1976a). This means a challenge for the educational world. The increase of educational facilities is not proportional to the population growth rate.

The illiteracy rate

Although the illiteracy rate has considerably decreased since Indonesia's independence (95% in 1940 to about 40% in 1974), its existence still constitutes one of the big challenges faced by Indonesia today.

The illiteracy rate of the population by age over 10 has been estimated as follows:

national : 40%
urban : 21%
rural : 45%
male : 29%
female : 51%

(International Bank for Reconstruction and Development, 1974)

2. THE EDUCATIONAL SYSTEM AFTER INDONESIA'S INDEPENDENCE

Article 31 of the Indonesian Constitution states that

'(1) Every citizen shall have the right to obtain an education', and

'(2) The Government shall establish and conduct a national educational system which shall be regulated by statue'.

Pancasila is the ideology underlying Indonesia's educational system, this has not been changed since 1945.

In his paper delivered at the Conference of District Heads and Fourth Conference of Muhammadyah Student Associations in Ujungpandang, 1975, the Minister of Education and Culture stated that 'education can be defined as an effort or activity which is deliberately made and planned for purpose of changing human behavior. What is desired in our country is a Pancasila-minded man whose daily conduct reflects the integrity of the five principles'.

In article 10 of the Indonesian Constitution for Education it is stated that every child when six years of age has the right to enter elementary school; and for a child of eight years there is even compulsary education for at least six years. This means that the minimal educational requirement is to finish elementary school. In 1956 a pilot project for compulsary education has been conducted in several regions, but there was no follow up study in terms of a of systematic evaluation, so that the wish of the Government to establish compulsary education by 1961 has not yet been realized (BP3K 1976a).

2.1. The formal schoolsystem

The formal schoolsystem comprises six-year primary education (SD), a three-year junior secondary education (SLTP), and a three-year upper or senior secondary education (SLTA).

For graduates of primary and junior secondary schools there are schools of vocational education at the junior secondary and upper secondary levels. Graduates of senior secondary schools may, if they

pass the necessary institutional entrance examination, continue to academic institutions (ITB,ITS, IPB or IKIP), universities or other forms of tertiary education (see figure III.1).

2.2. The growth of enrolments rate.

The increase of elementary school pupils as well as of junior and senior secondary school pupils in the period between 1900-1970 show a sharp trend after Indonesia's independence. Although this sharp trend is of course gratifying, it also causes problems in providing educational facilities. The sharp increase in pupil enrolment could not be balanced by a proportional increase in educational facilities to guarantee good quality in education.
Another consequence is that many schools do not fulfil the requirements of an educational institution.

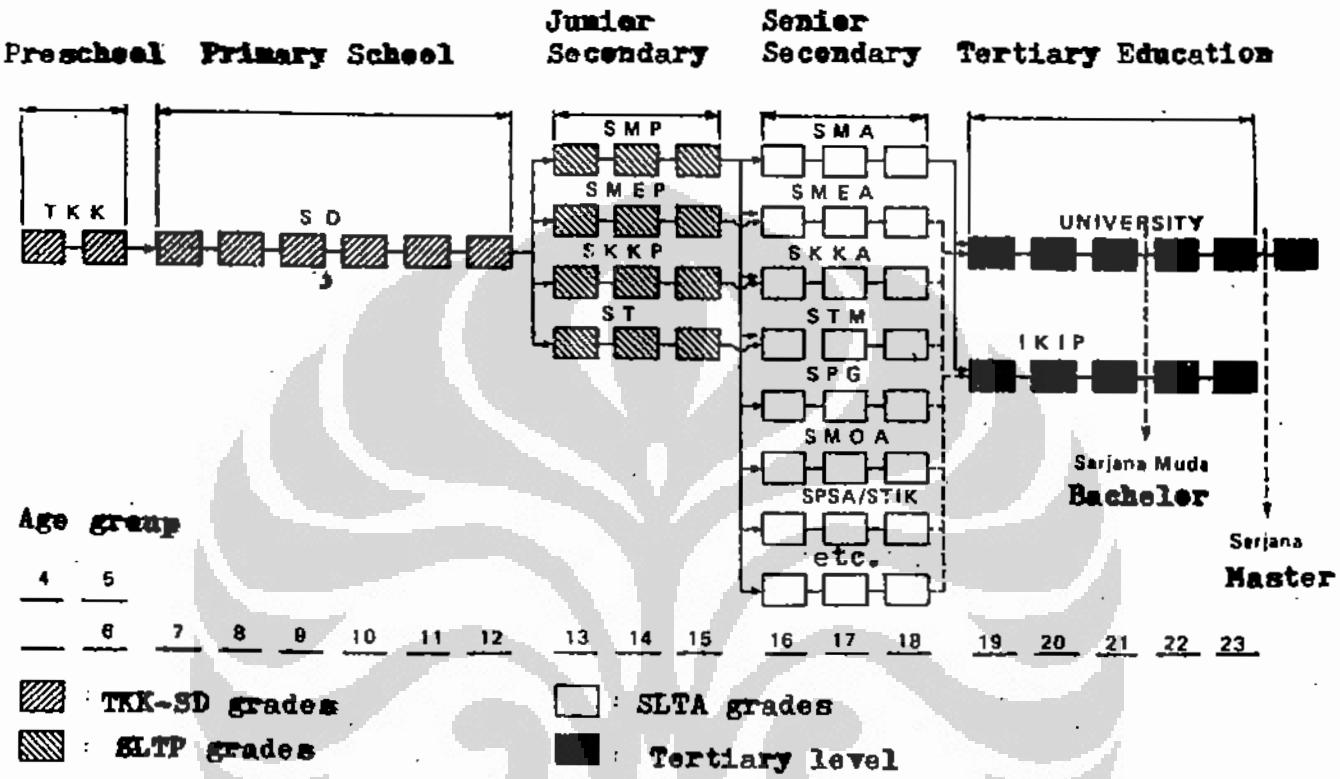
Comparison of age and the number (amount) of population going to school.

The amount of school enrolment increases from six till nine years, then decreases more and more until 23 years.
Proportionally (number of children as compared with schoolenrolment), particularly after 12 years of age the decrease become pronounced.

Proportion of SD and SMP pupils.

In 1975 there were 14.280.157 SD pupils and 1.900.154 SLTP pupils. (SLTP comprises all types of junior secondary schools, of which SMP

Figure III-1 :THE EDUCATIONAL SYSTEM IN INDONESIA



Source: BP3K, Pendidikan di Indonesia (1900 - 1974)
Dep. P dan K, 1976, Jakarta

constitutes the greatest proportion). Of the latter group, 1.518.393 were SMP pupils, which means about 10% of the SD pupils (BP3K, 1977). Hence the SMP population already represents a strongly selected population.

Among the different types of lower secondary level schools, the SMP seems to attract most of the students. Of 1.528,1 thousand SLTP's in 1973, 1.199 thousand (or 78%) were SMP's, 115 thousend were SMEP's, 45,6 thousand were SKKP's and 168,3 thousand vere ST's (Dep. P & K, BP3K, 1976). It also enjoys the highest status (20% of its entrants come from the highest socio-economic classes), probably because of its preparatory function. (BP3K, 1976a).

Ratio of schoolage population and number of schools

If we look at the ratio of the schoolage population and the number of schools fitted for that age group, we find that with increasing age less schools are available.

At the primary level, the ratio was 311,
at the junior secondary level 1.194
at the senior secondary level 2.514, and
at the tertiary level 46.084
(Source: Central Bureau of Statistics).

2.3. Types of schools.

In Indonesia there are many private schools beside the public schools: 64% of the elementary schools are public, and 59% of the junior secondary schools are public (BP3K, 1977).

Private schools are classified as subsidized private (subsidi), partly subsidized (bantuan), or fully private (swasta), according to amount of governmental support they received.

A private school which seeks financial assistance from the Government must fulfill the following conditions:

An 'aided' school must have functioned for at least two years as a fully private school, have at least two qualified teachers, be operated by a recognized institutional body, and three-fourth of its students must meet public school entrance requirements. 'Aided' schools receive assistance from the government for teacher salaries, but fees are not requlated. After three years, an 'aided' school may become a 'subsidized' school, if it meets more stringent requirements, e.g. all students meet public entrance requirements, the school must use the national curricula and employs at least three qualified teachers. The subsidy consists of either reimbursement for all teacher salaries or the employment of public teachers in the school. Finally, the school may subsequently become a state school (BP3K, 1976a,p. 1.3).

In 1971 the Ministry of Education and Culture established a number of experimental 'Development Schools' related to eight IKIP's (Teacher Training College). In the beginning it has been organized in a sequence of eight years of basic education followed by four years of secondary education, but since 1974 the Development School model involves eleven years of education, sequenced as five years elementary (thus one year shorter than the traditional school), three

years junior secondary, and three years senior secondary education. It has been planned that partial dissemination of tested curriculum materials will take place from 1978 onwards (Soedijarto, 1976b).

3. GOAL AND OBJECTIVES OF NATIONAL EDUCATION

The general aims of national Indonesian education has been formulated by the Indonesian Peoples Assembly as follows (Soedijarto, 1976a).

> 'To educate a 'development-oriented' man with the character of Pancasila and to develop Indonesians who are helthy, mentally and physically, having knowledge and skills, being creative and responsible, democratic and tolerant, being able to develop high intellectual abilities, being conscientious, and loving the nation and mankind, consistent with the values of the 1945 Constitution' (p. 28).

In 1971 the Office of Educational and Cultural Research and Development conducted a comprehensive survey to identify educational objectives relevant to the national needs for development. Based on the survey of societal needs in 1973 educational objectives had been formulated for all subject areas and all levels of education (Soedijarto, 1976b).

These objectives have been generated to overcome four basic problem areas in education, problems related to quantity, quality, relevance and efficiency of education.

More specific objectives were formulated related to a). the field of knowledge (which include the basic knowledge to be attained), b). the field of skills (including among others: mastering good

learning methods, able to solve problems systematically and able to participate in social activities) and c). the field of values and attitudes, which involves among others: accept and apply Pancasila and the Indonesian Constitution 1945 (objective c1), appreciate national culture and tradition (objective c6), self-confidence (objective c7) and developing initiative, creative ability, critical attitude, rational and objective in problem-solving (c10) (BP3K, 1976c,p. 82-86).

The importance of developing a creative attitude through educational experience has been stressed by the Minister of Education and Culture in his 1975 paper (Minister of Education and Culture, 1975):

> 'Both school education and out-of-school education have the same aim of providing activities which are deliberately planned and carried out in order to bring man from the state of unskillfulness, from inactive and passive attitude into active, critical and creative attitude.'

4. CURRICULUM AND INSTRUCTIONAL METHOD

Since Indonesia's independence in 1945, various educational reforms have been established. In the first phase, beginning 1945 up to the first half of the sixties, special emphasis has been given to an increase of people's access to education and this strategy has been quite successful (Soedijarto, 1976b). After 1965 it was increasingly realized by educational policy-makers that the educational system was not effective and relevant to societal needs and more specific to the economic development programs.

Various curricula have been developed since 1947, notably in 1962, 1964, 1968 and 1975, the last two being used at the present time in most of the schools. Outside some differences in subject matter content, these curricula are similar in that they are based on the traditional learning strategy, in which the teacher functions as the disseminator of information,and furthermore, in that they are subject matter oriented.

Realizing the shortcomings of the existing educational system, the Development School Project was designed in 1971, with its modular instructional system as the teaching-learning strategy.
Its main characteristics as compared with the traditional schools are presented in table 3.1. Another characteristic of the Development Schools is that they include special vocationally oriented programs. These schools are still at an experimental stage of development, so that it is too early to evaluate their effectiveness.

Table III.1

Some Characteristics of the Development School in comparison with the traditional one

School type Dimension	Development School	Traditional School
1. Curriculum organization	Broad field and integrated approaches	Subject-matter approach
2. Curriculum administration	Continuous progress, flexible	fixed
3. Curriculum content	Selected topics, and concepts relevant to objectives	Knowledge and facts following the structure of the subject matter areas
4. Teaching-learning strategies		
1. the role of the teacher	As the organizer, resource person and facilitator of learning activities	As the disseminator of information
2. Evaluation strategy	Continuous, as feed-back information, using criterion reference and norm reference tests.	Occasional, to rank students in a class-room, using only norm reference tests

Source: Soedijarto, The Modular Instructional System as the Teaching-Learning Strategy in the Indonesian Development School.
BP3K, 1976a, Jakarta.

According to the National Assessment Survey, teaching in primary schools can be described as 'traditional but competent'. The schools are generally effective in establishing basic skills in reading, writing and arithmetic, but little time is spent and few materials are available to develop manual skills, artistic ability or favourable attitudes toward manual work. The emphasis is on routine skills and on rote memorization of a limited range of facts. 'Children are ussually not encouraged to ask questions and there is little in the average classroom to encourage students to use their imagination, to raise problems of their own, to seek solutions to non-routine problems or to show much initiative' (Indonesia Education Sector Survey Report, May 1974).

The tremendous amount of memorization required in schools might indicate low quality and lack of relevance. Other indications are the high drop-out and primary school repeater rates (Setijadi, 1975).

The Survey Report (1974) stated that 'curricula at the secondary level entail an excessive number of weekly subjects (15-24) and class sections (40-46) which militates against learning any subject well'. They are burdened by inherited syllabi, ill suited to the circumstances in a predominantly rural country, and with little relevance to the society. The lack of textbooks required the students to spend much of classroom time in copying notes from the blackboard. As was the case at the primary level, their studies depend excessively on rote memorization.

However, recent developments in education indicate efforts by the government to improve the situation.

During the First and Second Five Year Plans new textbooks were developed and printed in a large scale so that every student will have his own textbook. The 1975 curriculum, although still traditionally oriented, is encouraging the teacher to use the enquiry method and discussions, and to rely less on rote memorization. Teachers are retrained to use the new textbooks and curriculum (Setijadi, 1977).

5. QUANTITY AND QUALITY OF TEACHER

Quantity

In 1971 Indonesia employed almost 500.000 primary teachers, of whom about 85.000 were religion school teachers. Of the remaining 415.000, 50.000 were temporary and religion teachers in public primary schools.

About 30% of the teachers were female (BP3K, 1976c).

The pupil-teacher ratio in 1973 was about 31 at the primary level, 14 at the junior secondary level, and 11 at the upper secondary level.

Overcrowded classes are especially evident in the early primary school years. Classes average around 40 students, but the average class size varies from 55 students in grade one to 28 students in grade six.

It has been reported that in 1971 about 25% of the urban teachers and 35% of the rural teachers taught more than one class simultaneously (BP3K, 1976a). Yet it seems that the number of teachers is not

the crucial problem, at least not at the secondary level. It has been estimated (Daroesman, 1971) that half of the secondary teaching force teach less than 20 hours a week.

The situation in 1977 for Primary Education is entirely different. During 1974 - 1977, 32.000 new three-classroom Primary Schools were built and the corresponding number of new teachers appointed. In many of these new schools the average class size is relatively small (Setijadi, 1977).

Quality

A more serious problem seemed to be the lack of adequately trained teachers. Teacher qualifications are often inappropriate for the subject taught. In the National Assessment it was found, that only 43% of secondary school teachers were adequately prepared.

Many teachers are not satisfied with their jobs, because they do not get the appreciation they deserve. Low salaries force many teachers to hold two or three jobs simultaneously, which dissipate their efforts, and scatter their time. On the other hand, it has been found that those teachers who are active in increasing their income, are also those who are most resourceful and productive. Neither type nor level of diploma seemed to be decisive factors for their success of failure as teachers.

The same is true for salary and position, both do not quarantee quality. On the other hand the total income, both from the school as well as from other sources seemed to influence the quality of teaching, as does experience. (National Assessment Survey, 1976)

In general, teachers are willing to accept innovations in the educational system, but they are often not adequately prepared to carry them out, e.g. in the Development Schools. These schools require a totally reorientation of the teacher's role; being no longer simply a source of information, which is provided by the module, but rather the 'organizer of educational activities'.

In-service training as it has been carried out, has not yet proved to be the correct solution in improving teachers' quality. Usually they still adopt a conformistic attitude with respect to the demands of the people (parents), so that schools are more interested in preparing pupils to pass an exam, than trying out new teaching methods (BP3K, 1976a).

Salaries of teachers have been much improved since then, and new methods of teacher training has been applied; it is still too soon, however, to evaluate the results of these new efforts (Setijadi, 1977).

6. THE NEED FOR EDUCATIONAL EVALUATION AND TESTING

While the emphasis of the First Five Year Plan was on economic development, in the Second Five Year Plan, which started in April 1974, the educational sector has received much greater attention (although the major thrust is still economic).

The increase of Government revenues on the one hand, and the pressure from society to pay more attention to social welfare, allowed for an increase of almost 500% in the education budget (Setijadi, 1975).

This shift in emphasis opened wider perspectives especially for primary and secondary education, it made it possible to start new ventures in education. It has been pointed out by Elley (1971, as cited by the BP3K, 1976a)that 'at present, no national examinations are conducted, no standardized tests of achievement or aptitude exist, and little effort is made to evaluate the many expensive projects and programs being developed.

Teachers lack the proper tools necessary for diagnosing, guiding, individualizing, and checking children's leafning, while the selection of students for further education and for scholarships and financial aid is haphazard, unreliable, and extremely wasteful of time, effort, and student opportunity'.

A system of evaluation and testing is needed, that can guide the process of change in each new program and project, evaluate the results, and show the effects of each innovation on the total system of which it is a part (BP3K, 1976a).

The following major areas for evaluation and testing were stated:

1. Selection of students
2. Evaluation of projects, programs and systems
3. Developing tests and instruments for classroom use

6.1. Selection of students

Problems of selection include:

1. Selection for admission to the next higher level of schooling.
2. The identification of talent.

6.1.1. Selection for admission

Although by article 31 of the Indonesian Constitution 1945 'every citizen have the right to education', in fact the need for schooling considerably exceeds the actual possibilities for placement. This holds for all level, but especially for higher education.

Plans to increase the entrance to primary schools and to reduce the number of drop-outs will certainly result in increased competition for entrance to secondary schools, which are already unable to accommodate all who wish to enter, and a system of standardized objective tests seems the only fair way of handling the situation (BP3K, 1976a).

At present decisions are based upon results of an admission test, set by the individual schools and usually achievement tests are being used for this purpose.

6.1.2. Identification of talent

In the Second Five Year Plan (Repelita II) a program exists for developing talent and achievement, which intend to give scholarships to students (at secondary and University level) with outstanding capacities and who would otherwise be compelled to drop out. This quite novel program faces Indonesia (the educational sector) with big problems, involving:

a. the construction and use of appropriate tests to identify these candidates

b. to establish criteria to determine which of the able students are most in need of financial aid, and

c. a follow up of the scholarship holders to assess whether the criteria and instruments of selection used were appropriate and effective.

The criteria used in selecting prospective scholarship holders are:

1. outstanding talent, measured by psychological tests
2. outstanding performance, measured by achievement tests
3. economic state, measured by questionnaires and by observation
4. good personality, measured by pshychological tests and by observation.

If psychological tests and/or achievement tests are not available yet, the selection will be based on instruments that can be accounted for.

6.1.3. Some Considerations: School-achievement or psychological tests?

It is certainly gratifying that the need for psychological tests (ability and aptitude tests) has been recognized by the Ministry of Education and Culture in Indonesia. For developing countries with limited resources, the importance of educated manpower and effective utilization of human resources ('the right man on the right place') in achieving national goals become very crucial. The need for aptitude tests in problems of selection and placement in developing countries (including Indonesia) has also been stressed by Professor Slamet Iman Santoso (1952) and by Arici (1972) from Ankara. To use

school performance as a general criterion for the allocation of further opportunities has been common practice in many developing countries. But the situation is rapidly changing, as the limitations of such procedures are being recognized (standards may vary from school to school).

In a recent article in Journal of Cross Cultural Psychology (1977, 8, 49-70) Drenth discussed the arguments for and against school performance on the one hand and ability or aptitude tests on the other hand.

In the next few pages we follow his line of reasoning. According to Drenth the use of school grade or achievement tests has several advantages:

1. they are more easily available to teachers and educators;
2. they have a proper validity, certainly when the content of subjects during previous schooling (which make up the content of the acievement tests) resembles the performance to be predicted;
3. successful completion of the previous school as a preparatory phase is a prerequisite, or a condition for an adequate adjustment during the next higher learning institution;
4. the use of school performance has a strongly motivating influence.

There are two rationales to defend selection based on previous school performance:

- The first is of an <u>educational</u> nature: it presupposes knowledge and skills in the previous educational institution as required in the

the next higher level institution (e.g. good performance in Arithmetic at the Primary School is a condition for success in Mathematics at the Junior secondary level), since the two learning processes are supposed to run in conjuction with each other.

- From the psychometric point of view previous school performance is used as a predictor of future school performance, since both are supposed to be dependent on the same 'learning ability'. Previous school performance reveals qualities within the student that are also needed in the next learning institution, so that those who do well on the previous school, will also succeed on the next higher school.

Here a few remarks (contra arguments) have to be made:

- There is the need for empirically demonstrated correlations between previous and present school performance.
- If there is much variance in quality of schooling, then use of school performance as a predictor for further school success, and for selection and admissions policy, does imply discrimination against children from low quality schools.
- The same argument of discriminatory selection holds for a number of environmental conditions, e.g. socio-economic status, which may also influence school performance (Drenth, 1977).

With respect to the use of ability and aptitude tests in school admission or in the detection of talented students, as being more potentially oriented and less influenced by quality of school, the

following restrictions should be considered:

- For school performance the students has to study, to prepare himself. His success is not only a matter of ability, but also depends on how motivativated he is to succeed.
Educationally seen, it seems fair to reward industriousness and hard work.

- There is still the possibility that psychological tests have a discriminatory character, in the sense that they favour children from higher social strata and better educational backgrounds. More or less every test is culturally determined.
To overcome this problem, one should firstly find out to what extent the test is affected by skills that the test is not intend to measure (e.g. being able to calculate, to understand written instructions etc.) and secondly if they occur in the test variance one should make sure that these skills are overlearned to such a degree that they do not produce substantial variance in test scores (Drenth, 1975).

- Another problem in using psychological tests concern difficulties in test taking. 'Test anxiety' as a consequence of the 'strangeness' of the test situation and of the test stimuli to which the student is not accustomed, may well influence his performance.

- When it needs experts to administer psychological tests, the applicability as mass selection instruments in Indonesia is greatly hampered.

It is clear that both achievement test and psychological tests have their advantages as well as limitations. As long as we do not

have empirical data to prove the superiority of either of the two types of measures in problems of school admission or talent identification, the best solution seems to be to apply both whenever possible, and to conduct short-term as well as long-term follow up studies to assess their effectiveness as predictors.

Drenth finishes his paper with the recommendation to use school performance (preferably measured by means of standardized achievement tests on a nationwide or at least on a regional basis) to be used as a criterion for admission or selection purposes provided an empirically demonstrated or logically plausible relationship exists between the measured achievements in the previous school and the learning process in the next. These achievement tests however should be used in an absolute fashion; with other words they should be used to reject only those that do not meet the minimum standards for admission. Whenever the number of acceptable students exceeds the number that can possibly be admitted, (and this is almost universally the case in developing countries, including Indonesia) selection should take place with the use of aptitude or ability tests that have shown a substantial correlation with the future school performance.

Another problem that should be considered particularly for developing countries concerns the desirability of school grades as predictors. More and more it has been realized by educational planners that the existing school system could not meet the challenges of a developing society.

A barrier was felt between educational institutions and society concerning curriculum content, methods of teaching, the hierarchical structure of the school system and the evaluation techniques used (Minister Mashuri, Basic Memorandum on Education).

The drop out rate of 60% at the primary level and the fact that many graduates cannot find suitable jobs because they do not meet requirements, are indicators of the extent of wastage in the educational system. (BP3K, 1976a).

In the new curriculum that is now being tried out at the Development Schools, practical training is more included.
Considering that the elementary schools are primarily teaching basic skills (the three R's) and preparing the child for the next higher academic institution, whereas the higher levels and certainly the primary level in itself should be more oriented toward practical needs, one could say that the situation exists in which 'the formal hierarchical system in education can be seen as increasingly irrelevant for the modernization process in developing countries' (Drenth, 1975).

When it is realized that elementary education has its own aims, not merely preparatory, then, as Drenth put it: 'school grade should not be valid' as predictors for the next level of schooling, because past performance is most valid as predictor when it is most similar to the performance to be predicted.

The situation, where the educational system is not felt as meeting society's needs, does not only exist in Indonesia. In Tanzania attempts are made to direct primary education more towards practical functions, such as agriculture, housekeeping, small trade, etc. rather then towards exclusive preparation for secondary school.

6.2. The second major area of evaluation and testing concerned the evaluation of projects, programs and systems.
Tasks to be carried out under this heading and which have high priority involve the evaluation of achievement in the basic school subjects in primary and secondary schools throughout Indonesia.

6.2.1. The National Assessment Survey

In 1973 a national assessment of achievement levels in Indonesian schools has been started by the Office of Educational Cultural Research and Development (BP3K). Its main purpose was to provide objective information for educational planners, curriculum writers and other educators on the extent to which the educational system is achieving its objectives throughout the republic.
More specific objectives involve: locating regional differences in achievement levels, identifying environmental conditions associated with achievement, determining week and strong parts of the curriculum, collecting information about the education system against which to measure national progress in the future and providing achievement norms against which to measure the performance of individual children and schools (BP3K, 1976b).

Multiple choice tests have been constructed for the primary school sixth grade in the four main subjects, mathematics, science, social studies and Bahasa Indonesia. For the Junior Secondary School third grade, English was also tested.

In addition questionnaires were designed for pupils, teachers and headmasters. The pupils questionnaires contained 52 simple question, designed to determine a number of student's personal and environmental conditions.

The first survey had been conducted in 1975 at the grade six level, the second in 1976 at the grade nine level (SMP third grade).

6.2.2. Results of the Grade Six Survey

The sample consisted of approximately 14.000 sixth graders, distributed over ten regions throughout Indonesia.

On all tests the same trend is seen, that children in Jakarta are achieving at much higher levels than children in other regions. South Sumatra and West Java also show high mean scores, but as one moves away from Jakarta, a general decline in achievement levels has been found. Regions in which the children are performing at a high level are well established urban areas where industrialization plays an important role.

Schools in remote isolated areas are few, enrolments are generally low, and adequately trained teachers scarce.

We quote the following summary on school variables in achievement (BP3K, 1976b, p. 59-60).

a. Type of school: Private school children show considerably higher achievement levels than children in state, 'subsidised' and 'aided' schools.

b. Size of class: Unexpectedly it was found that children in large classes perform better than those in smaller classes (our comment: may be because smaller classes are mostly found in remote isolated areas?).

c. Size of school: Again, those children who attend large schools achieve at higher levels than those in small schools (our comment: again, small schools may be found in isolated areas with less facilities. Another assumption: most probably the large schools are high quality schools, attracting many students).

d. Training of teachers: Those teachers with the longest periods of training produce higher achievement in their pupils than those with limited or no training. The only unexpected finding was that the small group of teachers identified as SLTA (Senior High School) graduates produced higher results than the rest. Possible explanations for this exception are that these teachers are a more intelligent group than those who have passed through the SPG (secondary level teacher training school), or that they are drop-outs from an IKIP, or that they are taking further training courses in an IKIP. It would require another study to clarify this matter. However, there seems to be some justification for a policy which takes SLTA graduates and provides them with a short period of teacher training in order to meet an

urgent need for teachers. (BP3K, 1976b,p. 50)

e. Experience of teachers: with minor exceptions those teachers who have taught longer produce better results than those with little experience.

f. Sex of teacher: Women teacher get better results from their pupils than men.

g. Age of teacher: Generally, the trend is for children with older teachers to do better.

h. Additional teaching posts: Contrary to expectation, it was found that teachers who have positions in more than one school, produce higher achievement levels in their pupils.

i. Morning and Afternoon Schools: There were only small differences in achievement levels according to the time of the day of the school.

j. Use of textbooks: Surprisingly, children with insufficient textbooks do almost as well as children with plenty, and in mathematics they achieve better. Furthermore, teachers who use the prescribed textbooks showed inferior results overall (this confirms the need to analyse the quality of the new textbooks, in terms of their suitability for the teachers and for the pupils (BP3K, 1976b,p. 56).

k. In-Service Training of Teachers: Little or no advantage was found in the achievement scores of children whose teachers had undergone in-service training.

1. Other school variables: Finally, higher achievement was shown by pupils in schools with many full-time teachers, many part-time teachers, school libraries, many classroom facilities, and teachers who used modern methods, frequent tests and regular home-work.

The results of the Grade Nine Survey which has been conducted October 1976, at the same time as the present study, were not yet available.

In our study which also involve 6th and 9th graders we made use of the achievement tests and part of the pupils questionnaire developed by the BP3K for the National Assessment Survey.

6.2.3. Psychological tests to evaluate educational systems.

Other tasks that come under the heading of evaluation of projects, programs and systems are among others: evaluation of the Development Schools, evaluation of the program for the identification of talent, evaluation of new textbooks, evaluation of in-service courses for teachers.

In the evaluation process of educational systems or institutions not only achievement tests, but also psychological tests may make their contributions.

At this point we want to refer to Hofstee's principle of 'inverted diagnostics' which we have mentioned in the first chapter, to use psychological (ability and aptitude) tests not only to make decisions about individuals, but as evaluators of educational systems.

We agree with Drenth (1975) that 'the varying correlations of the different aptitude tests with school performance ... throw light on the content and objectives of the educational system, at least as these are operationalized in grades and examinations' (p. 13).

6.3. The third major area of evaluation and testing is the development of tests and instruments as tools for classroom and school use.

6.3.1. Two types of tests are being developed by the BP3K:

A. Tests for the use of classroom teachers

   a. standardized tests of achievement for primary and secondary students to be used by teachers, to identify weaknesses and strengths etc.

   b. Diagnostic tests of specific weaknesses.

   c. Mastery tests related to particular textbook units.

B. Tests of aptitude and interests for students guidance.

6.3.2. Creativity (divergent thinking) tests for selection purposes.

We have pointed out that aptitude and ability tests play a significant role in determining a student's intellectual capacities, and that they should possibly be used in conjuction with achievement tests in admission and selection procedures, as well as in detecting creative talent in children.

The studies of Guilford et al (1956, 1959, 1962, 1967, 1971, 1973), Getzels and Jackson (1962), Torrance (1959, 1962b,1965), Wallach and Kogan (1965), Yamamoto (1964d,1965) and others have shown that aptitudes and abilities as measured by the traditional

intelligence and achievement tests most often used in school practice constitute only a very limited part of the whole range of human intellectual abilities (this is also demonstrated by Guilford's Structure-of-Intellect model).

The studies of Getzels & Jackson (1962), Torrance (1959), Yamamoto (1964a)and Wade (1968) showed equal efficiency of creativity and intelligence measures in predicting school success.

Their studies even suggest that an important part of the potentially gifted children would have been excluded if assessment procedures were restricted to narrowly defined measures of 'intelligence' (often restricted to verbal scholastic aptitudes and memory). Guilford (1950) emphasized that most of the creative thinking abilities come under the divergent thinking category, although he pointed out that other abilities, such as cognition, memory, convergent thinking and evaluation may also play an important role in creative productivity. He redefined intelligence so as to include creative behaviors. Torrance (1965) pointed out that the concept of 'giftedness' need to be broadened from that of the 'child with the high I.Q.' to include the 'highly creative child'. He at the same time stressed that a school's grading system, awarding of honors and scholarship should give recognition to creative achievement.

In the USA the National Merit Scholarship Corporation (Holland and Kent, 1960) recognized that many of their scholarships might be going to the wrong persons. Later this organization established a

program for giving scholarships to two categories of students:

a) students with high creative promise and

b) students who are truly outstanding in some one field, although they may be less outstanding in others.

Handlin (1962) believed that current grading or evaluation systems encourage memory, accuracy, neatness, and cautiousness, but rarely call upon students to use their ability independently to deal with situations in which the answers are not known but must be discovered. Strong (1959) advised to include in the examinations in all subjects, problems that call for creative responses rather than mere reproduction of facts.

We will end this chapter with the conclusion that psychological tests certainly have their merits in addition to achievement tests in the process of making decisions about students as well as about educational systems, and that the tests should possibly represent a variety of dimensions of cognitive functioning, including measures of creative thinking.

Chapter IV

THE EMPIRICAL STUDY

In the preceding chapters the basic considerations leading to the design of our study, its significance and its general purpose have been presented (chapter I), followed by an overview of the main contributions in creativity research (chapter II) and an introduction into the existing educational system in Indonesia (chapter III).

This chapter deals with the empirical study.

In the first section the general as well as the specific objectives will be stated.

The next section presents the research hypotheses based on theoretical considerations and on research findings as found in literature.

The third section concerns the design of the present study.

The fourth section describes the Pilot Study - conducted to try out the experimental tests and to select the test items for the definite battery - and discusses its results.

This section is also concerned with the description of the nature and rationale of the selected instruments: the Creativity Battery, the Creative Attitude Scale, the convergent thinking (intelligence) tests, the short-term memory tests, the school achievement tests, the composition scoring scheme and the Ideal Pupil Checklist.

The final section deals with a description of the sample, the data collection and the methods of data analysis of the main study.

1. OBJECTIVES OF THE STUDY.

1.1. General objective.

The main purpose of this study is the identification of some measures of divergent thinking (creativity tests) and to determine their relationships to other intellectual measures on the one hand, and with a number of educational variables on the other hand.

1.2. The specific objectives of the study are as follows:

1. The development of some instruments related to creativity:

1.1. a battery of divergent thinking measures (the Creativity Battery)

1.2. a scale to assess creative attitude in children (the Creative Attitude Scale)

1.3. a scoring-scheme to evaluate creative writing ability.

2. The study of relationships between the variables.

2.1. To determine the relationship between the divergent thinking tasks and other intellectual measures (discriminant validity), i.e.:

2.1.1. convergent thinking measures ('intelligence')

2.1.2. short-term memory measures

2.2. To compare the relationships of creativity, intelligence and memory measures with school performance.

2.3. To determine the relationships of the divergent thinking measures with criterion performance (convergent validity), i.e.:

2.3.1. Creative writing ability as assessed by the scoring-scheme to be developed.

2.3.2. Teacher ratings on pupil's creativity

2.4. To determine the relationships of the divergent thinking measures with a non-aptitude trait of creativity: creative attitude as measured by the Creative Attitude Scale

2.5. To explore the relationships of the measures of divergent thinking, convergent thinking, rote memory, school achievement and composition writing with some personal and environmental variables.

3. The adaptation of Terrance's Ideal Pupil Checklist for this study.

3.1. To compere teachers' perception with parents' perception on the 'ideal pupil'.

3.2. To compare teachers' and parents perception on the 'ideal pupil' with experts' opinion on the 'creative personality'.

2. FORMULATION OF THE HYPOTHESES

Based on theoretical considerations and on research findings as found in literature, the following hypotheses were formulated for the present study:

2.1. - In view of the Structure-of-Intellect model, in which divergent production, convergent production, and memory represent distinct dimensions in terms of modes of operation it was predicted that there will be significantly positive intercorrelations among the divergent thinking measures (Hypothesis 1.1.) and also significantly positive correlations among the convergent thinking measures (Hypothesis 1.2) and among the short-term memory measures (Hypothesis 1.3). On the same grounds, and based on Guilford's (1962) conception as well as research findings that cognitive, convergent

thinking and memory factors make significant contributions toward creative performance, but that most of the creative abilities can be identified as belonging to the category of divergent thinking (see chapter II), it was predicted that there will be positive correlations between measures of divergent thinking and measures of convergent thinking, as well as between measures of divergent thinking and memory measures, but lower than the intercorrelations among the divergent thinking measures (discriminant validity Hypotheses 1.4 and 1.5).

2.2. -Based on the same reasoning that convergent thinking, divergent thinking as well as memory measures play a significant role in any problem solving activity, including school performance, we expect that there will be significantly positive correlations between:

- measures of divergent thinking and school performance (Hypothesis 2.1)
- measures of convergent thinking and school performance (Hypothesis 2.2)
- measures of short-term memory and school performance (Hypothesis 2.3)

Based on the studies of Getzels and Jacksons (1962), Torrance (1959), Yamamoto (1964d) and others, that the high creative groups and the high intelligent groups are equally superior in school achievement, we expect that measures of intelligence and measures of creativity are about equally predictive of school performance (Hypothesis 2.4)

2.3. -In the present study the writing of a composition, scored for creative writing ability, and teacher's rating of pupil's

creativity, have been designed as external criteria for creative performance, and to extimate the convergent validity of the creativity measures. Hence it was predicted that creative writing ability scored according to the global (Hypothesis 3.1) and analytic method (Hypothesis 3.2), as well as teacher ratings of pupils' creativity (Hypothesis 3.3.) will be positive and significantly related to measures of divergent thinking ability.

2.4. -Considering

a. Guilford's conception and his research findings that the primary traits of creativity involve aptitude-as well as non-aptitude traits (chapter II),

b. Results of the studies from MacKinnon (1962), Roe (1952), Barron (1955), Taylor (1964) and others that personality traits play a significant role in the generation of a creative product (see chapter II), we would expect positive relationships between measures of creative attitude (Creative Attitude Scale) and measures of creative thinking (divergent thinkint tests , Hypothesis 4.1), measures of creative writing performance scored with the analytic method (Hypothesis 4.2) as well as with the global method (Hypothesis 4.3) and with teacher ratings of pupil creativity (Hypothesis 4.4).

2.5. - Research findings indicate that in general age is positively related to the performance on creativity tests, just like the other intellective and cognitive functions. Hence we would expect a significant difference between primary and junior secondary school in performance on: creativity tests (Hypothesis 5.1), intelligence tests (Hypothesis 5.2), memory tests (Hypothe-

sis 5.3), creative attitude (Hypothesis 5.4) and in creative writing ability (Hypothesis 5.5).

2.6. - Torrance (1965) studies in five different cultures using the Ideal Pupil's Checklist, have shown that teachers' and parents' perception of the ideal pupil bear very little resemblance with the conception of a creative personality, but that, on the other hand, among teachers and parents there is a very high agreement of favorableness or unfavorableness of characteristics in school children. These findings lead us to the formulation of the following hypotheses, that there will be highly positive correlations

- between teachers' and parents' perception of the ideal pupil (Hypothesis 6.1)
- between primary and junior secondary teachers' perceptions of the ideal pupil (Hypothesis 6.2)
- among experts' conception of the creative personality (Hypothesis 6.3)

At the same time it is predicted that there will be significant differences:

- between teachers' (Hypothesis 6.4) respectively parents' (Hypothesis 6.5) perception of the ideal pupil and experts' conception of the creative personality.

2.7. Several studies abroad have attacked the problem of creativity as function of the relationships between the individual and his environment.

These types of studies have emphasized five major factors: sex, socio-economic status, ordinal position in the family,

family size, and urban-rural enrivonment influences.

In general, the following results have been reported (Hurlock 1972, p. 320-321):

1. boys show greater creativity than girls
2. children of the higher socio-economic groups tend to be more creative than those of the lower groups.
3. middle, later-born, and only children are likely to be more creative than the firstborn
4. children from small families tend to be more creative than children from large families
5. children from urban environments tend to be more creative than children from rural environments. Authoritarian training is more common in rural homes.

In our study all these factors (except the last, because our sample has been confined to Jakarta) in addition to other environmental conditions will be explored, without setting up specific hypotheses. Measures of convergent thinking, divergent thinking, rote memory, school acievement and composition writing will be related to these personal and environmental variables.

3. DESIGN OF THE STUDY

The present study was designed to develop some instruments assumed to assess creativity in children (including a battery of divergent thinking measures, a Creative Attitude Scale and a Scoring Scheme to evaluate creative writing ability) and to study their relationships with other test variables, as well as with non-test variables and with educational performance.

Based on Guilford's Structure-of-Intellect model (1956) as conceptual framework the test variables in this study were deliberately selected and devised to constitute a nomological network, in which connections or relations between or within the constructs could be demonstrated. Three of the 5 operation categories were included: divergent thinking, convergent thinking and memory (Guilford 1971).

The Creativity Battery consists of six tests (selected from existing types of tests but with new items or items adapted for use in Indonesia), providing seven measures of divergent productivity. They have in common that they all belong to the semantic content category, but they represent different aspects or 'traits' of creativity (Guilford 1959). In a later phase of the study one other measure of divergent productivity belonging to the figural content category was included in the analysis.

The convergent thinking tests include one figural and one verbal (semantic) content category.

Of the two short-term memory tests one makes use of numerical items while in the other test the items are of verbal nature.

The Creative Attitude Scale was included in the study as a non-aptitude measure of creativity (creativity being conceptualized as multidimensional, comprising intellectual as well as non-intellectual traits). The scale represents various aspects of attitude related to creativity. The Creativity Battery and the Creative Attitude Scale were first tried out on a small sample to check on clarity of instructions, appropriateness of time-limits etc.

A Scoring Scheme has been developed to assess creative writing

ability in composition writing, an external criterion against which the divergent thinking measures will be validated.

The Ideal Pupil Checklist was intended to provide information on teachers' and parents' perceptions on the 'ideal pupil', to be compared with experts' perceptions on the 'creative personality'.

A Pilot Study has been conducted to select which of the preliminary tests or test items (in terms of discrimination value) would constitute the definitive test-battery.

Reliability studies of the divergent thinking measures include:
- test-retest reliability (coefficient of stability)
- odd-even reliability (coefficient of internal consistency)
- correlation of each subtest with the total score.

For the Creative Attitude Scale test-retest and odd-even reliability coefficients have been computed. For the Scoring Scheme to evaluate creative writing, interscorer reliabilities have been established.

Correlational validation studies have been conducted for the new instruments.

Three strategies (Dunnette 1966) have been attempted:

1. correlating tests
2. comparing groups of persons
3. factor-analysis

ad 1. For the Validation of the divergent thinking construct, discriminant as well as confirmative validity were considered. Convergent validity has been examined through correlations between the creativity variables with external criteria of creativity (composition writing) as well as with school performance (stan-

dardized achievement tests); discriminant validity in terms of correlation of the creativity variables with 'intelligence' and 'memory' measures.

ad 2. Two groups of pupils, rated as 'creative' and as 'not-creative' by their teachers were compared as to their test-scores on the creativity-battery.

ad 3. Factor analytic studies have been conducted comprising the creativity, intelligence and memory variables, as well as variables of school achievement and of composistion writing (external criterion). The factor analytic technique has also been used to explore what aspects of creative attitude could factorially be seperated.

Choice of sample:

The student population in this study consisted of 6th graders (SD - Primary School) and 9th graders (SMP - Junior Secondary School - 3rd grade). The two age levels were considered because we were interested in the effects of age differences on creative thinking ability, creative attitude and creative performance, as well as on the other testvariables. These are students who are about to take their final examinations. Considerations leading to the selection of these groups are both pragmatic as well as diagnostic: in order to be able to infer what effects educational systems have on the development of certain abilities, aptitudes and attitudes, and in order to be able to make differential predictions in allocation procedures, this can best be done when one has arrived at the end of the educational system.

In the present study Public Schools were selected because the majority of schools in Indonesia consisted of Public Schools

(see chapter III). Besides, according to the Inspectorate for Primary and Secondary Education, Public Schools represent students from all strata. Because of the limited sample size it was decided to restrict the study to Public Schools in Jakarta, but to include at leasts 3 schools from both levels (SD and SMP), located in different sections of Jakarta.

Environmental variables:

More clarity about the meaning of the constructs of the test-variables could be obtained from an analysis of a number of personal and environmental variables related to the testvariables. For this purpose we made use of a questionnaire devised by the BP3K, with some additional items. The questionnaire was designed for a nationwide survey on the assessment of the quality of Indonesian education in 1975 and 1976, and was to be filled in by the students themselves. It contained 52 multiple choice questions concerning socio-economic status, home circumstances and attitudes toward different subjects. They have been tested in a try out study by the BP3K and were slightly revised.

4. THE PILOT STUDY

The Pilot Study intended to try out the preliminary tests: the Creativity Test Battery and the Creative Attitude Scale, and to select the best items in terms of discriminative power (item-analysis). The scoring scheme to assess creative writing (of a composition) was also tried out in order to examine interscorer reliability.

4.1. Pretest. In a first pretest on a small sample (10 Subjects) ranging in age from 11 to 16 years, the following aspects of the try-out instruments were evaluated:

- whether the instructions were clear and well understood
- whether the time limits were appropriate
- whether the test battery was not too time consuming
- whether the children were able to hold their attention throughout the test or whether there were signs of fatigue or boredom.

Based on the results of the pretest it was decided to allow the same time limits for Three-Word-Sentences and Four-Word-Sentences. At first the time limit for Three-Word-Sentences was set on 150 seconds. This proved to be too short, the number of sentences produced was low, so that the time allowance was now set on 180 seconds, the same as for Four-Word-Sentences.

There were no problems in understanding the instruction. Besides the written instructions and an example given on the testform, the test-administrator gave an oral explanation and stimulated the children in participating, giving other examples and the like. It took about 110 minutes to complete the Creativity Test Battery and not more than 20 minutes to finish the Creative Attitude Scale.

The Creativity Battery for the Pilot Study consisted of the following subtests:

Name of test	nr. of items	time-limit/item
1. Word Beginnings	4	2 minutes
2. Anagram	4	2 minutes
3A. Three-Word-Sentences	4	3 minutes
3B. Four-Word-Sentences	4	3 minutes
4. Thing Categories	6	2 minutes
5. Alternate Uses	8	2 minutes
6. Consequences	4	5 minutes

It was planned that after item selection (based on its discriminative power) each subtest would only contain two items, so that

administering the whole battery of six subtasks would not take more than 45 minutes.

4.2. The try-out sample

Subjects for the Creativity test were 40 sixth grade and 40 ninth grade pupils. Subjects for the Creative Attitude Scale as well as for the composition-writing were 100 sixth grade and 100 ninth grade pupils.

Both samples were from Public Schools located in Kebayoran.

The number of boys were about the same as the number of girls.

The try-out testing was carried out on:

July 7th, 1976 : Creative Attitude Scale and composition writing.
Subjects : 100 sixth graders

July 15th, 1976: Creativity Test Battery, 40 ninth graders
Creative Attitude Scale and composition writing.
Subjects : 100 ninth graders

July 16th, 1976: Creativity Test Battery.
Subjects : 40 sixth graders

4.3. Description and raticnale of the selected instruments

4.3.1. The development of the Creativity Battery.

Rationale:

Operationally creative thinking ability has been defined as manifested in fluency, flexibility and originality in thinking. These are the primary traits the tests to be developed attempts to assess.

In his factor analytic studies Guilford (1950) hypothesized and found the following subprocesses of divergent thinking which

he identified as the primary traits of creativity: sensitivity to problems, word-fluency, associational fluency, ideational fluency, expressional fluency, spontaneous flexibility, adaptive flexibility, redefinition, originality and elaboration.

Sensitivity to problems was not included in the battery because the factor has been identified by Guilford as belonging to the general category of evaluative abilities, and in this study the concern is for the divergent thinking processes.

Redefinition was also not included, because this factor has been identified (Wilson et al., 1954) as belonging to the convergent thinking abilities.

In the selection of the tasks the attempt was to involve different kinds of thinking, each task contributing something unique to the battery under development. Each task requires the subject to think in divergent directions yet to bring into play different mental processes.

The following tests constituted the creativity battery:

1. Word Beginnings - as a measure of word fluency
2. Anagram - as a measure of word fluency
3. Three Word Sentences - as a measure of expressional fluency
4. Thing Categories - as a measure of ideational fluency
5. Unusual Uses - as a measure of flexibility and originality
6. Consequences - as a measure of ideational fluency and elaboration

The selection of subtasks assessing different traits related to creativity is a matter of representativeness. It also serves

a more theoretical goal in terms of fundamental research questions concerning creativity, such as the relation between creativity and intelligence (divergent thinking measures - convergent thinking measures).

How is word fluency related to convergent thinking?

How is ideational fluency related to convergent thinking?

How is word fluency related to ideational fluency?

Wallach and Kogan (1965) found that word fluency seems to have much more in common with general intelligence than ideational fluency (1965). If creativity and intelligence are different aspects of mental functioning, one would expect a high intercorrelation among creativity subtest, also among the traditionally defined intelligence subtests; but the correlation between creativity and intelligence measures should be much lower.

A typical problem for creativity tests is the development of a scoring procedure that

1. is not too elaborate and time consuming
2. guarantees sufficient objectivity and reliability

The problem is how to reflect in a score the rechness and uniqueness of a subject's response without sacrifying scoring reliabilities. In the selection of the creativity tasks as well as in the development of a scoring system a balance is maintained between objective and subjective methods. The first three tasks, being measures of word fluency and expressional fluency are simple in scoring and objectivity is sufficiently warranted. Whereas Thing Categories, Unusual Uses and Consequences, being measures of ideational fluency, flexibility and originality, are to a

certain extent susceptible to subjectivity in scoring. This could be balanced by specific scoring instructions and by stipulating norms in scoring.

Interscorer reliability has been established for the last three instruments (see chapter V). With regard to originality, as soon as a list of the responses found in the sample with their originality weights (being based upon the frequency of the given answers) has been composed, scoring is of no problem.

Most creativity tests yield different trait measures. The same task could be scored for fluency (by simply counting the number of relevant responses), for flexibility (only responses that fall within differenct categories are scored), for originality (the responses are weighted according to their statistical infrequency in the particular group being studied) or for elaboration (by counting the number of additional details above what is necessary to communicate the basic idea). Such is the case with Torrance's Tests of creative thinking, each test providing three or four measures. This could also be done with the six tests developed in this study. We did however not follow this procedure, because scoring would then become more complex and time consuming. Only one subtest, Unusual Uses yielded two measures, flexibility and originality.

The selection of the six subtests was based upon a review of the literature of existing creativity tests as well as upon our own experience in the field. Most batteries of creativity tests emphasize the verbal content category, but many also include figural and symbolic content categories.

Although we realize the advantages of covering a wide range of material or content categories, in this study we deliberately preferred the verbal content category for several reasons. Firstly we believe that it is through language that people in general express their ideas better than through any other system. Secondly, although the batteries represent figural or symbolic content categories, nevertheless they usually require verbal expression. (e.g. Torrance's Figural Circle test requested the subject to wirte or to mention what he has drawn). Thirdly, research findings indicate that reliability and validity coefficients are generally higher for the verbal tests than for the figural tests (Torrance, 1974; Schoppe, 1975). However, we did include additionally one figural test, Torrance's Circle Test, to explore its relationships with the verbal divergent tests and with the figural respectively verbal convergent thinking tests.

Time - limit.

In this study time limits were set.
Several authors claim, that the concept of thinking in different directions suggest 'an emphasis upon freedom and spontaneity that is quite inconsistent with the imposition of strong time limits upon performance' (Wallach & Kogan 1965). According to Wallach (1970) the face validity of the divergent thinking tasks would seem greater were they administered without time limits and in a context that did not carry ability-testing connotations.

Apart from theoretical considerations and research findings which have been discussed in chapter two, allowing more time would

make the test inefficient. Time limits are needed as one way of controlling conditions. Besides Guilford (1971) warned that what a test measures early in the working period might be different from what it measures later in time. In changing the nature of tests, the construct validities could be markedly altered.

1. Word Beginnings

Description and rationale: This test requires the subject to provide as many words as possible that begin with a certain syllable.

The test is a measure of 'word fluency': the ability to generate words that fulfil particular structural requirements (Wallach 1970). Word fluency was first used by L.L. Thurstone in 1938; it is the ability to think of words rapidly, each word satisfying the same letter requirements, such as containing a stated letter or syllable or containing two given letters.

This type of test has been widely used in creativity research. There are several versions:

Guilford mentioned a Word Fluency test in which the subject has to find as many words as he can beginning with a certain letter. The IDEA (Intelligence and Development Tests for East Africa) developed by Drenth et. al. has one test (Word Beginnings and Endings) where the subject is requested to write as may words as possible beginning with a certain letter and ending with another letter. Schoppe's 'Verbaler Kreativitäts-Test' = V-K-T (1975) includes 'Wortanfänge' where the subject is presented with a syllable as stimulus.

In selecting the test-syllables we experimented with various

letter combinations. Quite a number of syllables have been tried out on their 'associative fluency' (the number of responses they elicited). Those syllables were chosen which have about the same 'associative value'.

For test instrucitons and sample item see Appendix A.

Time allowance: A time limit of 2 minutes has been fixed for each items. There are four items in this test.

Scoring: A subject's score on this test is the total number of words that fulfil the stated requirements.

2. Anagram

Description and retionale: The Anagram test requires the subject to find other words in a test word by rearranging the letters. The test is also a measure of word-fluency, yet different from Word Beginnings in that it requires ease of perceptual reorganisation. Barron (1955) included the test in his battery of eight measures of originality, the solutions were scored for infrequency of occurence in the sample under study. Anagram is a commonly used test not only in creativity research. In Indonesia we have used this test in working with adolescents and with adults (for selection purposes) but then only one test word was given and the task wes twofold: first, to generate as many words as possible, using only the letters in the test word; second, the same tasks, but now each time the subject may add one letter that is not given in the test word.

In this study the Anagram test consists of four testwords ('items'). Each testword consists of four syllables, the word being chosen

based on their stimulus value (In a preparatory phase, various words of about the same length were tried out). Equivalent items were preferred. For test instructions and sample item see Appendix A.

Time limit: two minutes per item.

Scoring: the total number of correct words produced. Correct here means that no other letters were used outside those in the test word and that the words are correctly spelled.

3. Three-Word-Sentences

Description and retionale: The subejct is required to make three word sentences and is given the same three initial letters of the words to be used in all his responses, the order of the letters to be used is not fixed.

E.g. given the initial letters 's - m - p', one might write: 'Saya may pergi' or 'Papa makan salak'.

Based on his factor analytic studies Guilford found this test to be a measure of expressional fluency and it concerns the ability to put rapidly into juxtaposition words that meet particular requirements of sentence structure, such as writing alternative four word sentences when the first letter of each word in the sentence is specified. Schoppe (1975) included this type of test in his Vebaler-Kreativitäts Test (Vierwort-Sätze). Considering that the construction of four-word-secntences might prove difficult in the Indonesian language, in the pilot study a test of four-word-sentences as well as a best for three-word-sentences were included. Comparing the results of both alternatives in terms of the facility in producing sentences and in terms

of discrimination index (item analysis), we chose for the latter. (see table IV-1 and IV-2 in Appendix B).

Time limit: 3 minutes per problem. (a time limit of 2'30" which we tried out seemed too short to produce a reasonable number of sentences).

Scoring: the total number of appropriate sentences.
It was required that each new sentence may only use one word from the preciding sentence. Sentences which contain more than one word from the foregoing sentence did not add to the score. For test instructions and sample item see Appendix A.

4. Thing Categories

Description and rationale: The subject is presented two characteristics of objects (like hard and round) with the request to name objects, all bearing these same two characteristics.
The test is a measure of ideational fluency, the ability to generate within a limited time-ideas that will fulfil particular requirements. In term of Guilford's S-I model, ideational fluency is interpreted as the ability to produce divergently a number of semantic meaningful ideas (units). Again there are several versions of the test. Wallach & Kogan's Instances Test asked the subject to name all the round objects he could think of. The IDEA Thing Categories Test specified two characteristics of objects. Schoppe used a similar test ('Gleiche Eigenschaften') but here only one object characteristic is given. Christensen and Guilford (1963) varied the number of class specifications from one (as in the Wallach & Kogan form) to three. They found that a two specification item was optimal

for measuring 'divergent production of semantic units'.
In the first try out of this test six items were included, which after item analysis were reduced to four (see page 140), two of which were translated from the IDEA Thing Categories Test (Drenth et.al., 1974).

Time limit: two minutes per item.

Scoring: the total number of acceptable responses.

For test instructions and sample item see Appendix A.

5. Unusual Uses

Description and rationale: The subject is requested to think of as many uses as possible for a verbally specified common object. This is a much favoured test in creativity research. Torrance (1965) named it 'Unusual Uses', Getzels & Jackson (1962) included it in their battery under the name 'Uses Test', Schoppe (1975) as 'Ungewöhnliche Verwendungsarten'.

The idea for this test originates from a description of two similar tests used by Guilford in his factor-analytic studies of cognitive ability. One of these tests, labeled 'Unusual Uses' requires the subject to name several different unconventional uses for common objects.

The other test, labeled 'Brick Uses' requires the subject to name uses for a common brick. The test is said to assess 'ideational fluency' or 'spontaneous flexibility' depending on whether the scoring uses the number of responses or the number of classes into which the responses may be placed. It provides also an originality measure, depending on the infrequency of the response in the sample studied. In the Pilot Study we at

first included this test as a measure of ideational fluency, the score being the total number of responses regardless of their quality. The subjects were requested to find alternate uses for common objects. The results were not satisfying, there was a tendency to perseverate on uses within one category (e.d. for 'brick': to build a house, to build a school, to build a bridge, to build a wall). This 'functional fixedness' has more to do with rigidity than with creativity, which has also been pointed out by Goldner, (1957) in his study of rigidity. In Unusual Uses rigidity was identified as a tendency to give many similar uses, whereas flexibility was identified as variety, requiring freedom from 'functional fixedness'. We decided to exclude the fluency measure and to include instead a flexibility measure. The subjects were now instructed to think of other uses than usual and to avoid mentioning the common uses of the object, for which it was intended. We agree with Torrance that 'unusual' should be defined rather leniently, as any relevant use other than its usual use.

Time limit: two minutes per item with four testitems.

Scoring: The flexibility score was the total number of different types of responses not including the common use for which the object was intended. Beside the flexibility score this test was used to provide an originality score, originality being defined in terms of statistical infrequency in the sample under study. To determine the originality score all the responses found in the sample of 270 records were tallied. A score of zero

is assigned to all responses given by 5% or more of the respondents. A score of one point is given for responses given from 2% to 4.99% of the respondents. Responses given by less than 2% of the respondents received a score of two points.
For test instructions and sample item see Appendex A.

6. Consequences.

Description and rationale: Here the subjects were required to state what would happen if certain hypothetical events occurred, to think of all the possible consequences. This type of tests is commonly used in creativity testing, but under different names and using different items (e.g. Guilford: 'Consequences', Torrance: 'Just Suppose', Schoppe: 'Utopische Situationen'). The test was chosen for this study because it enables the subject to use his imagination and to elaborate his ideas, thus providing a measure of ideational fluency combined with elaboration (elaboration defined as the ability to take an idea or a task and spell out the detail, the ability to develop one's ideas, producing a variety of implications: one thing suggesting another). According to Torrance (1974), many individuals are unable to 'play with' the possibilities of hypothetical events and find such tasks intolerable. The psychologist Thurstone, once an assistant of Thomas Edison, is said to have selected his graduate students by suggesting some unusual idea or improbable conclusion. If the student crushed the idea immediately with convincing logic, Thurstone conlcuded that he did not have enough curiosity to pursue graduate study. It indicated that the student lacked the

ability to consider, evaluate, and play with unusual ideas to think through their possible consequences' (Torrance, 1974, p. 13).

Time allowance: four minutes per item; the tests consists of four items. In the try-out study subjects were allowed a time of five minutes for each item. It turned out that responses waned long before time ran out for each task. Especially at the elementary level five minutes seemed to be too much to hold their attention to the problem.

Scoring: In Consequences ideational fluency and elaboration are combined into one score. The score is determined by the number of different consequences or possibilities produced. The subject is also given credit for additional implications which enrich the idea. When subjects lest a number of different consequences or ideas within one sentence, credit is given for each such consequence or idea. Irrelevant or inappropriate responses do not receive credit. A response is irrelevant when the respondent merely restates the condition or describes conditions that already exists. It is inappropriate if the response would not be caused by the situation described, or if the response is rahter a cause then a consequence of the situation (Torrance, 1974).

For test-instructions and sample item see Appendex A.

Item analysis of the Creativity Test Battery.

In this study item selection of the Creativity Test Battery was based on the correlations between each item and the total (sub) testcore. The formula used for calculating the phi coefficient (discrimination-index), or ϕ is (Ferguson 1971, p. 348)

$$\phi = \frac{BC - AD}{\sqrt{(A+B)\ (C+D)\ (A+C)\ (B+D)}} \qquad (1)$$

where A, B, C and D are the four cell frequencies.

In convergent thinking teststhe categories 'pass' and 'fail' may be considered a dichotomy of an underlying continuous ability variable. In divergent production tests there is no 'pass'-'fail' criterion, because there are many possible 'correct' answers to one item (variable). In order to differentiate between 'high' and 'low' groups, the variables were artificially dichotomized; based on the median of the total test-score, the group was divided into two equal parts: 20 high and 20 low. For each of the groups the frequency (score)-distribution of each item was calculated. After finding the median of the item, phi can be calculated by the formula above (1).

		Total (sub) Test score	
		< md	> md
'item'	< md	A	B
	> md	C	D

Dichotomizing the variable into two equal parts, based on the median,

makes $(A+B) = (C+D) = \frac{1}{2}N$

and $(A+C) = (B+D) = \frac{1}{2}N$

Formula (1) will be $$\phi = \frac{B(\frac{1}{2}N-D) - D(\frac{1}{2}N-B)}{\sqrt{\frac{1}{2}N \cdot \frac{1}{2}N \cdot (A+C)(B+D)}} =$$

$$\frac{\frac{1}{2}N(B-D)}{1/N\sqrt{(A+C)(B+D)}} =$$

$$\frac{B-D}{\sqrt{(A+C)(B+D)}} \qquad (2)$$

$\frac{A+C}{N} = q$ and $\frac{B+D}{N} = p$ or $(A+C) = Nq$ and $(B+D) = Np$

Substitution in formula (2), makes $\phi = \frac{B-D}{N\sqrt{pq}}$.

Dividing numerator and dinominator by $\frac{1}{2}N$, makes $\phi = \frac{P_H - P_L}{2\sqrt{pq}}$ (3)

ϕ coefficients have been calculated by:

1. comparing every item with the total score of the subtest to which it belongs
2. comparing every item with the total score of the whole battery of six subtests

The results are presented in table IV.1 and table IV.2 (see Appendix B).

The phi coefficients based on total test-score are somewhat lower than the phi coefficients based on total subtest-score, but whether based on subtest-score or on total test-score, most of the items are significant. In the item selection, both criteria were considered, but when this was not possible preference was given to the correlation with the total subtest-scores as criteria.

Based on the relationships with the total test-score as criterion, creativity is conceptualized as one homogeneous factor. Comperison with the total subtest-score is based upon the assumption that creativity or creative thinking ability comprises several specific (sub) factors, as constituted by the several subtests. The subtests in the Creativity Battery do not require the same kind of mental ability, though all belong to the divergent production category with semantic (verbal) content. The mental ability required in a test of word fluency (Word Beginnings and Anagram) is quite different from what is required for flexibility or originality in thinking. Even in test 1 and 2 , although both assess word fluency (Guilford, 1950), the mental ability involved is not exactly the same. In Word Beginnings all one needs is associating the stimulus syllable with as many existing words as possible, while Anagram requires an'untying' of the stimulus word and reorganizing the letters into other words.

Subtest 1: Word Beginnings.

From table IV-1 (SD) and table IV-2 (SMP) it can be seen that all four items differentiate significantly between high and low groups, at the SD as well as at the SMP level. It was decided to retain the four items for the definite test, with the consideration of having two parallel-tests of two items each.

Subtest 2: Anagram

At the SD level, based on subtest total-score the phi-coefficient of all four items are significant. When the total test-score is used as criteria, item 3 is not significantly

discriminating. At the SMP level, the phi-coefficients are significant at the,01 level, when based on subtest total-score, but with the total test-score as criteria, only the phi-coefficient of item 3 is significant (at the .01 level). As indicated previously it was decided, in case of incongruency, to give the correlations between items and the subtest total-score priority.

Therefore, all four items were maintained, with the consideration of a parallel test for later use.

Subtest 3 A & B: Word Sentences

Test 3A: Three-Word-Sentences: at the SD as well as at the SMP level, the phi-coefficients are significant both with the subtest total-score and the total test-score as criteria.

Test 3B (Four-Word-Sentences) on the other hand had only one item (item 1) discriminating significantly, when the groups were divided based on the median of the total test-score, at the SD level. Based on the subtest total-score however, all four items were significant.

At the SMP level, for all four items the phi-coefficients were significant. It was decided not to include test 3B in the definite battery, also because of the low productivity of responses.

Looking at the means of the subtest total-score (SD : 8; SMP : 16), being about two responses per item of the SD level, the test appeared too difficult.

Subtest 4: Thing Categories

All six items are significantly differentiating, at the SD level as well as at the SMP level, based on both subtest total-score and on total test-score. The selection of item 1, 2, 3 and 5 for the definite test, was based rather on qualitative analysis. Although statistically significant, item 4 and 6 are difficult to score, in terms of defining objective criteria, as to what can be considered approriate responses.

Subtest 5: Alternate Uses

In the Pilot Study three different measures were considered for this test:

Fluency : the total number of relevant responses

Flexibility: the number of categories into which the responses fall

Originality: based on statistical infrequency of the responses in the sample under study. An originality list was not drawn in the Pilot Study, because of the restricted sample.

It turned out that in general the flexibility score was very low, (SD : mean of the subtest total-score, consisting of 8 items: 14.67, averaging 1.83 per item; SMP: mean = 22.7, averaging 2.83 per item); the fluency-score was remarkably higher (SD : mean 23.47, averaging 2.93 per item; SMP mean = 39, averaging 4.87 per item).

Given the instruction to name all possible uses for common objects, many children perseverated on responses within the

same category. In order to compel them to think of different categories of use, it was decided to alter the instructions in the definite study: the emphasis would be to think of uncommon uses for the objcet, and not to name the common use, which will not be scored. With this altered procedure in scoring, the name 'Unusual Uses' seemed more appropriate.

As indicated previously, the underlying rationale was that the tendency to give many responses that all fall within the same category, but nevertheless received a score for fluency, is in fact reflecting regidity instead of creativity (Goldner, 1957). From the 8 items in the experimental test, 4 were selected for the definite test: item 1, 4, 5 and 7. To find out what the effects of the change in instruction and scoring system would be on the phi-coefficients, a second try-out testing was conducted in October, using the 4 selected items and the new instructions and scoring-method. The results were satisfying. At the SD as well as at the SMP level the phi-coefficients (based on subtest total score) were significant at the .01 level for all 4 items.

Subtest 6: Consequences.

For all of the four items the phi-coefficients were significant, at the SD as well as at the SMP level, and whether based on subtest total-score or on total test-score (see table IV.1 and IV.2 Appendix B).

All four items were retained for the definitive test.

Conclusions:

The original design was that in the try-out study (Pilot Study)

each subtest comprises minimally four items (Subtest 4 has 6 items, and subtest 5 includes 8 items, the rest contains 4 items). The intention was to retain 2 items in each subtest after item-analysis. Far more items turned out to be usable than were necessary for the definitive test battery, in which each subtest includes only 2 items. It was decided to retain 4 items for each subtest to be used in the main study, considering that in the future it might be possible to use them as 2 parallel-tests, if they stand the parallel form reliability test to be conducted in the main study.

4.3.2. The development of the Creative Attitude Scale.

It is commonly accepted that there are other traits (non-aptitude traits) underlying creative performance outside the modality of creative thinking aptitudes. One of the purposes of this study was to develop a scale to assess the creative attitude in children.

One would expect a creative attitude to have significant determining effects upon whether or not an individual exhibits creative performance.

Schaefer (1971) defined attitudes as learned, emotionally-toned predispositions to react consistently, favorably or unfaforably, toward persons, objects or ideas.

The Creative Attitude Scale (CAS) consists of 32 statements for each of which the child is to indicate his agreement or disagreement (see Appendix A).

Item construction was based upon a review of the literature with

respect to the characteristic attitudes, beliefs and values of persons who were identified as being creative.

Two of the 32 statements (items 10 and 18) are filler items, designed to reduce the visibility of the instrument.

The remaining 30 items were included to asses the following traits associated with creative attitude:

- Openness to novel and unusual experiences
- Flexibility of thinking
- Freedom of expression
- Appreciation of fantasy
- Interest in creative activities
- Confidence in own ideas
- Independence of judgment

In order to control for acquiescence response set, half of the statements were worded in such a way that an affirmative answer was scored in the creative direction and the other half in such a way that a negative answer indicated a creative attitude.

Scoring: Each of the 30 statements related to creativity is scored 1 or 0 depending on whether or not the response is indicative of a creative attitude. Thus the possible range of scores is from 0 to 30, the higher scores indicating a more favorable attitude toward creativity. Multiple responses to an item are scored 0.

Time allowance: No time limit was set in the instructions, the students in general required approximately 10 - 15 minutes to complete the scale.

Schaefer constructed a Creativity Attitude Survey for use with elementary children. The following items were adopted from his scale, based on face validity, taking into account the situation in Indonesia.

Item number:

5. in drawing lessons I would rather think up a picture on my own than trace or copy one.
3. I think it is better to keep quiet in class than to give ideas that might be wrong.
7. I think that the best answers are always the ones the teacher thinks are right.
15. I think day dreaming is always a waste of time:
20. I would rahter play games that I know well, than learning new games.
23. If someone gets an idea that is different from everyone else's, the idea is probably not very good.
31. I feel that I have a good imagination.
32. I like to think up new ways of doing things, rather than doing them in the same old way.

Item Analysis of the Creative Attitude Scale.

In the preparatoty phase, about 60 items were brought together, each of which was thought of to be related to the variables determinative of creative attitude. Most of the items were newly constructed, and some were adapted from Schaefer's Creativity Attitude Survey. After discussion with two senior psychologists the number of items was cut down to 40 on the

basis of face-validity for the above mentioned dimensions.

In order to discover what particular items discriminated most effectively, an item analysis of the scale was carried out.

The try-out sample consisted of 100 subjects from the elementary school 6th grade, and 100 subjects from the junior secondary school 3rd grade. Of the 40 items, at the elementary level, 9 differentiated significantly at the .01 level (ϕ = .256), and 14 at the .05 level or better (ϕ = .196). At the junior secondary level, 17 of the 40 items discriminated at the .01 level, and 4 at the .05 level.

The sample was dichotomized into a high (50 subjects) and a low (50 subjects) group, based on raw scores.

The phi-coefficient was computed using the formula:

$$\text{phi} = \frac{p_{high} - p_{low}}{2\sqrt{pq}}$$

p_{high} = proportion in the high group scoring the item correctly

p_{low} = proportion in the low group scoring the item correctly

p = proportion of the total group scoring the item correctly

q = proportion of the total group scoring the item incorrect.

The results are presented in table IV.3 and IV.4 (Appendix B)

Combining the results of the sixth grade and the ninth grade samples, the 30 items with the highest phi-coefficients were selected for the definite scale.

4.3.3. The convergent thinking tests.

It was intended to include two measures of the convergent thinking category in this study, one verbal (semantic) and one figural in content.

The chosen instruments were:

1. Figure Exclusion

Each question in this test consists of five figures. Four figures are similar in one respect. The subject is required to identify the one figure that does not show this similarity. This test is part of the TIKI, developed jointly by the Free University of Amsterdam and the University of Pajajaran (Drenth et.al., 1977). The test has been standardized for Indonesia.

Time limit: 6 minutes

Scoring: One point for each correct response.

Maximum score: 26

2. Word Relations

Each item consists of four words. The subject is requested to identify two words with either identical, or contrasting meanings. This test is also part of the TIKI.

Time limit: 7 minutes

Scoring: One point for each correct response.

Maximum score: 40.

4.3.4. The short-term memory measures.

It was designed to include two measures of short-term memory, one with numerical and one with verbal (semantic) content.
The selected instruments were:

1. Remembering numbers.

The subject is instructed to memorize fifteen numbers of two digits. When the time is up, he has to recognize these fifteen numbers mixed among fourteen other numbers.
This test is part of the Intelligence and Developmental tests for East Africa (IDFA), developed by the University of Dar Es Salaam and the Free University of Amsterdam (Drenth et.al., 1974).

Time limit: 1'15" to memorize
1'30" to recall

Scoring: the number of items correctly recalled.

2. Word Memory.

The subject is instructed to memorize twelve pairs of unrelated words. Thereafter he has to recall the second word being mixed among four other words, when the first word of the pair is given. This test is also part of the Intelligence and Developmental tests for East Africa (IDEA).
The test was adapted for use in Indonesia. The words were not merely translated, but a careful selection has been made of words that were neither too long nor too short, to avoid ready to handassociations and that were not difficult in meaning.

Time limit: 1 minutes to memorize
2 minutes to recall

Scoring: the number of items correctly recalled.

4.3.5. The School Achievement Tests (Test Prestasi Belajar)

The school achievement tests used in this study were developed by the Office of Educational and Cultural Research and Development (1976), intended for use in a national assessment survey in Indonesian schools. The main purpose of the assessment was to provide information for educational planners on the extent to which the educational system achieved its objectives throughout the republic (for more specific objectives, see the report, 1976).

The first survey has been conducted in 1975 at the grade six level and in 1976 at the grade nine level (junior secondary school, third grade). Pupil's learning in the four main subjects: mathematics, science, social science and Bahasa Indonesia has been evaluated, at the grade nine level also the subject of English was included.

In preparation for the construction of the test, a close analysis was made of the contents of current and new curricula.

Most of the testitems are of the multiple-choice or completion type, covering all levels of skills ranging from simple recall of information to application and inferential thinking. The Bahasa Indonesia test also includes a measure of listening skills.

The tests were tried out on carefully selected urban and rural samples. After revision, the test contained about 60 - 72 items, and schowed high reliability (split half) and high curriculum

(content) validity, (see table IV.5). Validity was also assessed by correlating test results with the teachers' assessment of the children in the try out testing phase, with satisfactory results.

Table IV.5

Split half reliability of
the Grade Six Achievement Test

	Number of questions	Administration time	Split half Reliability	Average Difficulty
Science	60	90 min.	.85	45%
Mathematics	60	90 min	.86	54%
Social Science	72	72 min.	.89	48%
Bahasa Indonesia	71	90 min.	.91	50%

4.3.6. The development of an analytic scoring-scheme to assess creative writing.

Analytic versus global rating-method

In 1917 Willing introduced the analytic method in the rating of compositions according to their separate qualities on a number of aspects. Followed by Van Wagenen (1920), in the years 1920-1930 analytic rating-schemes were developed.

Scince 1925 the global rating method was introduced as a way of evaluating composisitons. This method was based on the conceptions of Hillegas (1912), Breed and Frostic (1916) and Trabue (1917) and is also named the 'short impression method', 'impressionistic method' or 'wholistic marking' (Wesdorp 1974).

In an analytic rating scheme a complex ability (e.g. creativ-

ity in writing) is broken down into a number of aspects (or part-abilities) to be rated separately, while global or wholistic rating is based on an immediate rating of the product as a whole, without an analysis of the various aspects. Much research has been done in comparing both methods with regard to their effectiveness (reliability and validity).

Interrater agreement.

There is much variance in interrater agreement as mentioned in the literature. It depends on:

- level and homogeneity of the group being rated
- the analytical scheme, its 'objectivity' in use

But it also depends on the level and homogeneity of the raters. It is to be expected that there will be more agreement when the raters have the same background experience, educational level, interests, age, sex etc.

Hartog (1941) and Bonnardel (1946) concluded from their studies that in judging different categories (aspects) of an analytic scheme a 'halo-effect' is likely to appear.

The judges tend to rate the same skill or ability independent of the category they thought they were rating.

The term 'halo-effect' stems from Thorndike (1920): the tendency to judge or to rate in terms of a general mental attitude, toward the personality as a whole, in which the general attitude of approach or disapproval toward the subject colours every single judgment or particular qualities. The 'halo-effect' tend to be large when any single variable is not easily observed or

when it is ill-defined; in such cases the judge substitutes his general impression for the variable that he cannot rate directly (Allport 1954).

Interrater agreement was found highest when judging formal aspects, and less in judging the 'higher qualities' like content, originality and style (Bonnardel, 1946, Vernon and Millican 1954).

There was more subjectivity and interrater disagreement in judging 'higher' skills in contrast to the 'lower' linguistic technical skills (like spelling,sentence structure, punctuation).

As the latter was in general sufficiently mastered by the group under study, most variance arose from ratings of the 'higher' categories.

Goldman and Clarke (1967) were able to obtain fairly high interrater agreements (.83) by training the raters before they started rating. It seems that with carefully elaborated analytical schemes and enough preparation (training) of the raters it is possible to achieve high interrater agreement, even for the higher qualities.

Based on the global or wholistic rating method there is even more variance in interrater agreement. With the topics being more specified and agreement among the raters concerning the aspects being evaluated, interrater agreement increased from .42 in 1931 up to .93 in 1933, in a study among staff-members of the University in Chicago (Stalnaker 1934).

Comparative studies as to the effects of analytical versus global rating lead to the conclusion, that the analytic method

is not superior to the global method, or only minor differences in interrater agreement were found. Which method works better also depends on personal preference. In general, interrater agreement is somewhat higher with the analytical method, on the other hand it has the disadvantage of being a more complex procedure and requiring more time, which makes it more expensive. One advantage is that it provides more accurate exact information about the categories to be judged, The emphasis may be on formal linguistic skills, or on content categories, or on both equally accentuated. Most analytical schemes require some training of the raters to be thoroughly acquainted with it before they use it.

The global rating method is criticized as being superficial in that it tends to neglect the higher less technical aspects (e.g. style, originality). Research findings proved that the judges did rate such qualities, although not to the same extent (Diederich, French & Carlton, 1961)

The global rating method has however the advantage that it does not require any training, is less time-consuming and therefore economical. Handled by a team of independent raters, the global method appear to meet the requirements of reliability and validity with regard to the criterion (Wesdorp, 1974).

Whereas former analytical schemes mostly emphasize formal aspects in the rating of compositions, more recently schemes were developed in which the content categories receive more attention. According to Wesdorp such schemes as being developed by Yamamoto

(1960) and by Goldman and Clarke (1967) are exceptions. Yamamoto developed an elaborate scoring scheme to evaluate creative writing. All his categories are content categories, formal aspects are not included. His scale includes the following six general criteria: organization, sensitivity, originality, imagination, psychological insight, and richness. Each of these six general criteria was then divided into five components.

Torrance (1965) devised a scoring-scheme to evaluate the writing of imaginative stories, based on two general criteria: originality and interest, each of which comprises nine characteristics. Most of the criteria for 'interest' were obtained from the work of Flesch and his associates (Flesch, 1948; Flesch and Lass, 1955). The others were gleaned from a variety of sources (Colvin, 1902; Hinton, 1940; Applegate, 1949).
In determining the originality score, the following nine characteristics were considered: picturesqueness, vivid, flavor, personal elements, original solution or ending, original setting or pilot, humor, invented words or names and other unusual twist in style of content.
The following nine characteristics were used in scoring 'interest': conversational tone, naturalness, use of quotations, variety in kind of sentence, variety in length of sentence and structure, personal touch, humor (same as 'humor' under 'originality') questions and answers, feelings of characteristics.

Preparing for the development of a scoring-scheme to evaluate creative ability in the writing of a composition, the relevant

literature was surveyed in an attempt to determine what characteristics of compositions had been considered by others in rating them on creative writing.

Description and rationale.

It was assumed that in the writing of a composition a child would express his fantasy and imagination, a manifestation of his creative resources. We attempt to chose topics that would appeal to the interest and imagination of the children. In the instructions it was emphasized to write an interesting and exciting story, and not to worry about handwriting or spelling, so as to prevent the children from associating it with a schooltask, in the hope that they would feel free to express even bold ideas. In the scoring scheme to be developed four criteria of creativity were considered: fluency, flexibility, originality and elaboration or richness. Each of these four criteria comprises five components.

Fluency was assessed in the sense of the number of words used for the composition. If the testee used less than fifty words, his score would be one point. If he used 50 to 99 words, the score is two points. If he used 100 - 149 words, he would receive three points. A score of 4 points is given, when the production of words is 150 - 199. If he produced more than 200 words, the score would be 5 points. These quantitative criteria are based on an analysis of the compositions in the Pilot Study, which allowed us such estimations.

In flexibility formal espects of sentence structure were combined

with content categories. As flexibility is manifested in variety of ideas, or in non-rigid thinking processes, it was expected that the more creative persons will show more variety in the form of sentence, in use of sentence as well as in length of sentence. The two content categories are the use of imagination and the use of fantasy. In his scoring scheme Yamamoto distinguished between imagination- as the ability to 'associate away from' the original stimulus- and fantasy. The criteria for fantasy is the extent to which the production is not strictly of a factual nature. There may be 'imagination' without 'fantasy', but by definition, 'fantasy' implies 'imagination'. We adopted these two categories as characteristics of flexibility in ideas.

The criteria of originality include originality in theme, originality in solution or ending and originality in style of writing.

Humor was included as another component of originality. Stories are scored for humor if they have the quality of portraying the comical, the funny, the amusing, or if they are pleasantly surprising. Both Yamamoto and Torrance classified 'sense of humor' in the category of originality. Yamamoto pointed out that the criterion as to what consitutes humor may be fairly subjective. According to Torrance one simple criterion would be 'if it makes the rater laugh or smile'. But this is another subjective criterion, possibly depending on the sense of humor of the rater himself. The last component of originality is 'the use of invented words or names', also adopted from

Torrance's scheme.

A criterion of elaboration is the ability to develop and to enrich one's ideas; it needs not to be basic to the core of the story, but it would make the story more colorful or lively. The five components of elaboration or richness are: picturesqueness in expression, richness in emotion, empathy, personal element or ego-involvement and using conversation in the story. (For a description of each component, see Scoring-scheme in Appendix A).

The three following titles were suggested, of which the testee has to chose one: 1. Three wishes.

2. If I win Rp. 75.000.000,- in lottery
3. The most unusual experience.

Concerning the composition, questions of interest in this study are:

- How do the measures of composition writing ability relate to the measures of creative thinking? Both tasks require divergent production of ideas. A significant relation would be expected.
- Are there any relationships between creative attitude as assessed by the Creative Attitude Scale and composition writing performance?
- Are there significant differences between the performance of sixth graders as compared with ninth graders? According to Madeleine Thomas (in Rabin & Haworth 1960, p. 199) the 11 to 13 years age group is usually less productive, with less

originality.

Interrater agreement in composition scoring

The scoring-scheme developed was tried out in the Pilot Study to assess its usefulness and practicality, and to determine the inter-scorer reliability. A sample of 60 compositions was used (30 sixth graders, and 30 ninth graders), twenty of each topic. Raters were three staff-members of the Department of Child-Psychology at the University of Indonesia, Jakarta. The rating was done after a short explanation of the scoring-scheme but without preliminary exercise. The interrater agreement was high on the total score, ranging from .83 to .96 with an average correlation of .92. The agreement was highest on the fluency-score (average r=.97) and least on the originality-score (mean r = .60). On the flexibility-score the average r = .70 and on the elaboration-score. 76. (see table IV.6).

Halo-effect. Usually there is a tendency in rating particular qualities to be influenced by the global general impression; this will have an effect on the intercorrelations between the qualities or categories. Assuming that there is no halo-effect, we expect the intercorrelation-coefficients to be rather low. The following intercorrelation -coefficients were obtained from the three raters (see table IV.7).

Table IV. 6

Product moment correlations between three raters of composition (Interrater reliability).

Pilot Study

SD (N = 30)	r_{xy}	r_{xz}	r_{yz}
Fluency	.95	1.00	.95
Flexibility	.72	.78	.76
Originality	.47	.52	.49
Elaboration	.47	.80	.68
Total-score	.83	.92	.90

SMP (N = 30)	r_{xy}	r_{xz}	r_{yz}
Fluency	.93	.96	.96
Flexibility	.47	.79	.60
Originality	.55	.68	.79
Elaboration	.76	.81	.90
Total-score	.91	.96	.94

Table IV.7

Matrix of intercorrelations between the composition categories

Pilot Study

SD (N = 30)

rater x	Flu.	Flex.	Orig.
Flex.	.45		
Orig.	-.03	-.01	
Elab.	.26	.23	-.29

SMP (N = 30)

	Flu.	Flex.	Orig.
Flex.	.44		
Orig.	.07	.11	
Elab.	.45	.32	.16

SD (N = 30)				SMP (N = 30)			
rater y	Flu.	Flex.	Orig.		Flu.	Flex.	Orig.
Flex.	.32			Flex.	.43		
Orig.	-.07	.09		Orig.	-.03	.28	
Elab.	.28	.32	.04	Elab.	.36	.49	.22
rater z	Flu.	Flex.	Orig.		Flu.	Flex.	Orig.
Flec.	.56			Flex.	.56		
Orig.	-.04	.05		Orig.	.19	.52	
Elab.	.27	.32	-.11	Elab.	.42	.52	.37

The intercorrelation -coefficients between the categories are significantly lower than the interrater reliability-coefficients; thus the halo-effect is rather restricted. The intercorrelation-coefficients range from -.29 to .52. To what extent the halo-effect is of any influence is difficult to detect, because it is quite possible that some of the categories are basically related to one another, and others not, or to a less extent.

4.3.7. The Ideal Pupil Checklist.

Description and rationale.

The Ideal Pupil Checklist was included in this study to allow a comparative study of teachers and parents perception on the ideal child and its conjuction to the creative personality as conceptualized by experts.

Studies have been conducted in several countries to find out what teachers and parents in various cultures consider an ideal pupil. Parents and teachers were asked what kind of persons they would like their children or pupils to become. Torrance (1965) reported such a study in the United States,

Germany, India, Greece and the Philippines. The assumption is that educator's ('teachers' and 'parents') perception of what makes an ideal pupil would reflect his values in education. It would be useful to identify in a culture those values which encourage or discourage creative development.

To what extent do present attitudes of parents and teachers regarding desirable behaviors, reflect 'the creative personality'? Is there any incongruence between educator's concepts of ideal behaviors of children and behaviors which were found to be characteristic of creative persons?

The Ideal Pupil Checklist, developed by Torrance (1965) consists of 62 characteristics, 60 of which have been found through empirical studies to differentiate groups of highly creative people from similar groups of less creative people. (Torrance mentioned over 50 of such empirical studies). The two characteristics 'healthy' and 'physically strong' were added for reference purposes. The ideal composite of behaviors most typical of those who make out-standing creative contributions to society was described as: courageous in convictions, curious, independent in thinking and judgment, becomes absorbed and preoccupied with tasks, intuitive, persistent, unwilling to accept judgments of authorities (Torrance 1965). There was considerable evidence that teachers and parents prefer courteous, industrious and obedient behavior in their children, characteristics that seemed less conductive to creativity.

Torrance's Ideal Pupil Checklist was adopted for use in this

study. Some modifications and adaptations were felt necessary. Some characteristics were difficult to translate, or did not have an appropriate Indonesian aquivalent. One characteristic was not included in our list, namely: 'regresses occasionally'. This conception is based on the psychoanalytic theory of creativity, which views the source of creativity in conflict and creative product as a kind of sublimation of repressed complexes; the role of childhood experience in creative production is emphasized, creative behavior being seen as 'a continuation and substitute for the play of childhood' (regression). Our view of creativity is more in line with Roger's (1959) or Maslow's (1959) conception of creativity as a process of self-realization of the well-integrated personality. We therefore excluded this item from the list. For 'sophisticated' there was no appropriate Indonesian term which would describe the meaning of it without any wrong connotations, or without overlapping with other already included characteristics.

Instead of 'visionary' we substituted 'imaginative' which we viewed as an important characteristic of creativity that had not yet been included in the list.

For 'versatile' we substituted 'having broad interests', a trait that in Indonesia is strongly associated with being creative.

The list of 60 characteristics is presented in Appendix A.

For the sample of teachers and parents the following instructions were given:

'We like to have a picture of how educators in Indonesia perceive the ideal pupil, what characteristics you like them to have. Look at the list of characteristics on the following page. Check each of the characteristics you find important for the ideal pupil. Doublecheck the five characteristics which you consider most important and believe should be especially encouraged. Draw a line through the characteristics which you consider undersirable and which should be discouraged.'

The sample of experts were given the following instructions:

'We like to have your conception of the creative personality. Look at the following lists of characteristics. Check each characteristic that in your opinion reflects the creative personality. Doublecheck five characteristics which you consider most important in the making of a crative person. Draw a line through the characteristics which you consider unimportant in the making of a creative personality.'

This procedure has the advantage of being easy to administer within a short period of time under individual - or group-testing conditions.

Another procedure to obtain expert's opinion involved using Stephenson's Q-sort method which requires the subject to rate characteristics according to a forced distribution (Torrance 1965). This method is more refined and provides a standard against which the group ratings can be compared.

The 60 statements in the Ideal Pupil Checklist were transformed into a Q-sort. Each of the characteristics have been typed on

a set of cards.

The following instructions were given to the Q-sort sample (the same as has been used by Torrance except slight modifications):

'Use the 60 statements on this set of cards to describe your concept of the 'ideal' creative personality. Please follow the following procedure in making your ratings:

1. Pick out one characteristics which you consider most important in the making of a creative personality.
2. Pick out three characteristics which are the next most important.
3. Pick out the next five most important characteristics of what you consider the ideal creative personality.
4. Pick out the next nine most important characteristics.
5. Then the next twelve most important ones.
6. From the remaining 30 characteristics, pick out the one which you consider least important in the making of the creative personality or one which might actually be a liability.
7. Pick out the three next least important characteristics.
8. Then the next five least important.
9. Pick out the next nine characteristics that are not important.
10. There will now remain twelve characteristics.'

Analysis of data

For each of the three sample groups (teachers, parents and experts) an index was obtained for each of the 60 characteristics by weighting the responses as follows:

1 point for a doublecheck

2 points for one check

3 points for no check nor strickethrough

4 points for each strikethrough

On the bases of these indices the mean score was calculated for each of the characteristics, and based on the means aech characteristic was then ranked from one (most desirable) to 60 (least desirable).

Each set of rankings was then correlated with the other sets.

Based on the Q-sort technique the index for each of the characteristics was obtained by weighting the responses from 1 to 10 points according to the category into which they fell (see intructions). A mean index was obtained by dividing the index by the number of subjects in the sample, in this case :10.

With the group ratings the mean index was calculated by dividing the sum of indices by the number of subjects in the sample.

The group ratings were compared with one another by the product moment correlations. But in order to compare the group ratings with the Q-sort ratings, each characteristic was ranked from 1 to 60 and the correlations were computed by the rank-difference method, given by the formula:

$$rho = 1 - \frac{6 \times D}{N(N - 1)}$$ (Garrett 1961, p. 372)

rho = coefficient of correlation from rank differences

D = sum of the squares of differences in rank

N = number of pairs

5. THE MAIN STUDY

5.1. Sample - description

Sample of pupils

For this study two samples of pupils were selected, sixth

graders and ninth graders. As mentioned before (see the design of the study) we were interested to see whether an age difference of about three years would bring about an increase in performance on the various variables under study. It was also explained why we chose public schools for our sample.

In Jakarta there are about 1164 public elementary and 126 public junior secondary schools (in 1976). Three public elementary and three public junior secondary schools were selected.

For the selection of the three elementary schools we relied on data from the Office of Educational and Cultural Reserach and Development, In 1975 a nationwide survey has been conducted by the Office to assess Indonesian education, i.e. the school achievement in grade six. For this purpose achievement tests were constructed on the four main subjects. The main total achievement scores from schools in Jakarta in 1975 were used to estimate the achievement level or quality of the schools. On this basis, to guarantee heterogeneity of the sample, the three schools were selected as representing mediocre, high and low levels of achievement (assuming that the achievement level of 1975 also reflects the level of achievement of 1976). Thus the procedure at the elementary level was stratified random sampling. Concerning the junior secondary schools it was not possible to estimate beforehand the quality of achievement of the schools, because the National Survey on Grade Nine (SMP third grade) was only conducted in 1976.

With the Office of Educational and Cultural Research

and Development it has been organized that the junior secondary school sample of this study would be part of their nationwide and randomly selected sample, which made it possible to make use of the achievement tests and the questionnaire they constructed and that will be administered in their survey.

Another consideration in sampling was that the selected schools were located at different parts of Jakarta (Jakarta being divided in Central, North, South, East and West). Extremely large or small classes were excluded, the size of the classes ranging from 33 to 53 (in Jakarta there are classes as big as 70 pupils). Care has been taken for the sexes to be about equally represented.

The following six schools constituted the sample:

Primary schools:

Name of school	number of pupils	location
1. SD Manggarai	53	South - Jakarta
2. SD Taman Harapn	33	East - Jakarta
3. SD Tanah Abang	43	Central - Jakarta
Total	129	

Junior Secondary Schools:

Name of school	number of pupils	location
1. SMP Melawai	47	South - Jakarta
2. SMP Tebet Utara	50	South - Jakarta
3. SMP Jembatan Batu	41	West - Jakarta
Total	138	

The total sample consisted of: 267 subjects.

Scpecifications according to sex:

	male	female
SD	70	59
SMP	70	68
Total	140 (52%)	127 (48%)

The sample of the 'ideal pupil' study

The Checklist of 60 characteristics was administered to three different samples:

1. a sample of teachers and
2. parents to represent the educators view of the 'ideal pupil',
3. a sample of experts to conceptualize the 'creative personality'.

The teachers and parents were asked to check those characteristics in the list that identify the ideal pupil. The experts on the other hand were instructed to check those characteristics in the list that reflect the creative personality.

The sample of teachers consisted of 102 teachers from the six schools used in this study. There were 33 elementary school teachers and 69 Junior Secondary school teachers. They were from the following schools:

- SD Manggarai : 12 teachers
- SD Taman Harapan : 12 teachers
- SD Tanah Abang : 9 teachers
- SMP Melawai : 27 teachers
- SMP Tebet Utara : 27 teachers
- SMP Jembatan Batu: 15 teachers

The sample of parents consisted of 133 subjects, parents of pupils from three schools:

SD Manggarai	:	45 parents
SMP Melawai	:	44 parents
SMP Tebet Utara	:	44 parents

The sample of experts consisted of 30 staff members of the Faculty of Psychology, University of Indonesia.

The sample of experts using the Q-sort technique consisted of 10 staff members of the same Faculty of Psychology.

5.2. Description of data collection.

After the preliminary test have been tried out and item-analyzed in the Pilot Study, preparations were made for the main study, which was planned to be conducted in October 1976. For that purpose the definitive test instruments were reproduced.

In a meeting with the staff of the research department of the BP3K (Office of Educational and Cultural Research and Development) the objectives of this study and the research design were put forward and its planning was discussed. It was agreed that the study would be conducted simultaneously with the National Assessment Survey of the BP3K. The Inspectorate of Primary and Secondary Education was contacted to make arrangements with the schools concerned.

It was planned that the test administration in each school would take four days: three days for the school achievement tests and the questionnaire, to be administered by the teachers of the schools themselves, after having been coached by the staff of the research department of BP3K, one day for the psychological tests and the composition writing, to be administered by the staff of the Department of Child Psychology, and by graduate students who were doing their practicum (stage) in

that Department.

The study was carried out on the following dates:

For the three primary schools:

6 - 8 October 1976: school achievement tests, questionnaire

9 October 1976: psychological tests, composition

6 - 9 October 1976: teacher rating on pupil's creativity, Ideal Pupil Checklist to the teachers and to the parents.

For the three Junior Secondary schools:

11-13 October 1976: school achievement tests, questionnaire.

14 October 1976: psycological test, composition

11-14 October 1976: teacher ratings on pupil's creativity, Ideal Pupil Checklist to the sample of teachers and parents.

The Ideal Pupil Checklist based on two methods has been administered to the staff of the Faculty of Psychology University of Indonesia within the period of November 1976 to January 1977.

The testing has been conducted simultaneously at the three elementary schools and again simultaneously at the three junior secondary schools. During these four days school lessons were suspended for the classes participating in the study.

Sequence in test-administration.

1st day: Bahasa Indonesia and Science

2nd day: Mathematics and Social Science

3rd day: Questionnaire and English (the latter for SMP's only)

4th day: 1. the divergent thinking (creativity) tests

2. the convergent thinking (intelligence) tests

a. Figure Exclusion

b. Word Relations

3. the short-term-memory tests:

a. Remembering Numbers

b. Word Memory

4. the Creative Attitude Scale

5. the composition

Teacher ratings of pupils' creativity.

One of the objectives of this study was to examine the relationships between scores obtained on creativity tests and teacher ratings on pupils' creativity (confirmant validity).

The teachers involved in the assessments (at the SD level the classroom teacher and at the SMP level those teachers who taught the five subejcts assessed by the school achievement tests) were given a guideline in which 'creativity' has been operationalized into behavioral aspects assumed as indicative of creative behavior (see Appendix A for the Guideline). The intention was to standardize the rating to a certain extent and to facilitate the teachers in making their evaluation. In designing the rating procedure the main aim was to select one that was not too elaborate,easy to perform and will not take too much time of the teachers.

The teachers were asked to rate each of their pupils as 'creative', 'not creative', or as 'neither belonging to both groups'.

Scoring:

In the data analysis children rated as 'creative' are given a score of three points, those rated as 'not creative' receive one point, and the middle group, is given a score of two points.

Retest of the Creativity Battery and the Creative Attitude Scale at two schools.

To check on the stability of the divergent thinking measures and the Creative Attitude Scale, after six weeks (25 November 1977) the Creativity Battery and the Creative Attitude Scale were administered again to the two samples: one elementary school (SD Manggarai, N = 53) and one junior secondary school (SMP Melawai, N = 47).

The Circle Test.

At the same time Torrance's Circle-test, which has been claimed to be also a measure of divergent production but belonging to the figural content category, has been tried out. The same sample of loo subjects was used.

The Circle Test was included in this study to find out:

- The relationships between the convergent and the divergent production measure if they belong to the same figural content category.
- The relationship between a divergent production measure with a figural content and divergent thinking measures with a verbal content.

Considering content factors such as divergent-figural and divergent-semantic, it was predicted that divergent tests belonging to the same content category will tend to have higher correlations with each other than tests belonging to different content categories (Study of

Guilford & Hoepfner as cited by Cronbach 1971, p. 472).
Due to time shortage (the testing procedures occupied five full days of the students who were all in the examination class) no retesting of the Circle Test was possible. The structure of the testmaterial does not allow for reliability studies based on the split-half or the item-total correlation method.

Description and rationale:

The stimulus material consists of 36 circles, each with a diameter of 2 cm (one inch). The subjects are required to make as many different pictures and objects as possible, using the circle as stimulus. The circle has to be part of the picture and not just to function as a frame.
The test was developed by Torrance (1974) and is supposed to be a measure of the ability to make multiple associations to a single stimulus. The test yields measures for fluency, flexibility, originality and bonus originality.

Fluency : the number of responses minus the number of duplications and irrelevant responses.
A relevant response is defined as one which contains the circle (the stimulus element of the test) as an integral part. Responses in which the circle is used as a frame are considered relevant only if the response is presented as a picture and the circle is used as a 'picture frame'.

Flexibility : the flexibility score is obtained by counting the number of different categories into which a subject's responses can be classified. The list of categories

were derived from an analysis and classification of the responses of the sample (100 subjects).

Originality : Scoring for originality is based on tabulations of the responses of the 100 subjects. Responses occuring in more than 9% of the records are given no credit. Responses occuring in 5 to 9% of the records are scored one point; those occuring in 2 to 4% of the records are awarded two points. All other responses are awarded three points.

Bonus Originality Scoring: Combining 2 circles: 2 bonus points
3 to 5 circles: 5 bonus points
6 to 10 circles: 10 bonus points
11 to 15 circles: 15 bonus points
more than 15 circles: 25 bonus points

In the present study fluency, flexibility, originality and bonus originality scores were separately calculated.

Two composite scores were also computed:

I. Sumscore of fluency, flexibility and originality

II. Sumscore of fluency, flexibility, originality and bonus originality.

5.3. Methods of data analysis

The analysis of the experimental data from this study has been primarily based on the correlational method and the comparative approach. The relationships between scores on sets of variables based on the same samples of subjects were tested by the Pearson Product Moment correlation method. When examining data based on different sets of subjects (samples or groups), the comparative method was used.

To determine whether the differences between the means of variables were significant, the F-test and the t-test were used (Analysis of Variance).

The magnitude of t has been compared with the critical value of the t-table for corresponding degrees of freedom (sample size) and levels of significance.

In all analysis, significance was declared at least at the .05 level of confidence.

When rankings are available, the relationships were computed by the rank-difference correlation method, e.g. to compare the rankings from experts on the Ideal Pupil Checklist, based on the Q-sort technique with the rankings from teachers and parents.

Partial correlation coefficients have been computed to indicate the relationships between two variables, when the effect of another variable had to be controlled (e.g. to find out to what extent creativity contributed to school performance when the influence of intelligence is neutralized).

Multiple correlation coefficients have been calculated to indicate the maximum correlation obtainable from a combination of test variables with a criterion variable.

On the basis of an intercorrelation matrix of a set of test-variables (comprising the divergent thinking, convergent thinking and rote memory tests, school achievement as one composite score and the scores on composition-writing) the factor-analytic technique was used to see whether the variables may be 'reduced' to a smaller set of

factors or components which may be taken as source variables, accounting for the observed interrelations in the data.

Results of the data analysis will be presented in the next chapter.

Chapter V

RESULTS OF THE STUDY

In this chapter the results of the data analysis will be presented, covering the following major sections:

- In the first section reliability data of the developed instruments as well as of the other instruments used in this study are presented. Other statistical data (mean, standard deviation, range) are also included.
- The next section deals with the validation studies of the creativity Battery: relationships of the divergent thinking measures with other intellectual measures (discriminant validity); relationships of the divergent thinking, convergent thinking and short-term memory measures with school performance (concurrent validity); relationships of the divergent thinking measures with external criteria (convergent validity), and factor analytic studies.
- The third section contains the relationships between non-aptitude traits of creativity (creative attitude) with aptitude traits of creativity (the divergent thinking measures) and with external criteria of creativity (Teacher ratings and composition writing).
- The fourth section will be primarily concerned with analyses of variance that will reveal possible differences in performance among the three elementary schools participating in this study, differences in performance among the three junior secondary schools, and differences in performance between the elementary and the junior secondary schools.
- The fifth section will be devoted to a comparative analysis of teachers' and parents' view of the ideal pupil on the one hand and with experts' view of the creative personality on the other hand.

- In the final section a description of some personal and environmental variables and their relationships with the divergent thinking meesures will be discussed.

1. STUDIES OF RELIABILITY

Reliability indicates the degree to which error variance is being eliminated from the test variance.

1.1. The Creativity Battery

Reliability of the Creativity Battery has been established based on: interscorer reliability, test-retest, and split-half (odd-even) reliability. Correlations between subtest-scores and the total-test score have been calculated to provide a measure of the homogeneity of the test.

1.1.1. Interscorer reliability coefficients have been computed for the subtests Thing Categories (measure of ideational fluency), Unusual Uses (measure of flexibility) and Consequences (measure of ideational fluency and elaboration) of the Creativity Battery. A sample of 15 testforms (five randomly chosen from each of the three SD's) were independently scored by three graduate students after they have been given specific scoring instructions.
The results were as follows:

Table V-1: Product moment correlations between three scorers of the subtests Thing Categories, Unusual Uses and Consequences.

	TC	UU	Co
r_{A-B}	.99	.98	.96
r_{A-C}	.99	.98	.96
r_{B-C}	.99	.99	.94

The interscorer reliability coefficients range from .94 to .99. We may conclude that with specific scoring instructions there has been no difficulty in obtaining high levels of interscorer objectivity. Of course it should be kept in mind that the scorers have the same academic background and experience. With scorers of different educational levels and experience, some training in scoring may be required.

1.1.2. Test-retest reliability

The test-retest reliabilities have been obtained with a time interval of approximately six weeks.

Product moment correlations have been computed between the test- and retest scores of the seven measures of the Creativity Battery, for the elementary level and for the junior secondary level separately, and for the total SD and SMP group.

The results can be seen in table V-2.

Table V-2: Test-retest reliability coefficients of the Creativity Battery, obtained from SD Manggarai (SD1: N= 53) and SMP Melawai (SMP2: N = 47).

	N	WB	An	3WS	TC	UU	Co	Or
SD1	53	.65	.66	.67	.68	.75	.74	.65
SMP1	47	.81	.86	.68	.76	.75	.70	.69
SD+SMP	100	.78	.84	.72	.68	.73	.73	.67

The correlation coefficients range from .65 to .75 at the SD level, and from .68 to .86 at the SMP level. Both schools combined, the reliabilities range from .67 to .84.

Variations in test scores on retesting may result in part from

external conditions (such as uncontrolled testing conditions, distractors etc.) or they may arise from internal conditions, changes in the condition of the subject himself, such as illness, fatigue, emotional strain, recent experiences and the like (Anastasi 1976, p.110). The higher the reliability, the less susceptible the scores are to changes in the condition of the subject, or of the testing environment. The magnitude of the obtained test-retest reliabilities indicated reasonable stability and rather low temporal fluctuations.

1.1.3. Split-half (odd-even) reliability

Each of the six subtests of the Creativity Battery, providing seven measures of creativity, were divided in odd and even numbered halves. Each subtest consisted of four items, Product-moment correlations were computed between the sumscores of item 1 and 3 with the sumscores of item 2 and 4. The obtained correlations were then corrected by the Spearman Brown formula. Reliability coefficients were thus computed for each of the six participating schools and for the total SD sample and the total SMP sample.

The results are presented in the following table:

Table V-3: Product-moment coefficients of correlation between odd- and even numbered items of the subtests of the Greativity Battery (Corrected for the total test)

	N	WB	An	3WS	TC	UU	Co	Or	Total Test
SD1	53	.74	.70	.71	.75	.84	.70	.83	.93
SD2	33	.80	.64	.51	.35	.88	.56	.79	.90
SD3	43	.80	.71	.70	.54	.71	.69	.53	.93
SMP1	47	.89	.91	.88	.78	.83	.82	.79	.96
SMP2	50	.77	.90	.77	.68	.83	.74	.75	.93
SMP3	41	.77	.76	.88	.60	.69	.78	.66	.91
SD-T	129	.78	.76	.70	.72	.85	.77	.81	.95
SMP-T	138	.84	.88	.86	.76	.81	.82	.76	.95
SD+SMP	267	.86	.87	.84	.75	.84	.83	.80	.96

SD1 = SD Manggarai
SD2 = SD Taman Harapan
SD3 = SD Tanah Abang
SMP1 = SMP Melawai
SMP2 = SMP Tebet Utara
SMP3 = SMP Jembatan Batu

WB = Word Beginnings
An = Anagram
3WS = Three-Word-Sentences
TC = Thing Categories
UU = Unusual Uses
Co = Consequences
Or = Originality

Based on the total test score, the reliability coefficients corrected for the whole test range from .90 to .96 and are .95 for the total SD sample and also .95 for the total SMP sample. These coefficients are very high. Even for halves of the tests (uncorrected) the coefficients are still of a high order (see table V-4). Based on the total testcore, the half-test reliabilities range from .82

to .93, and are .90 both for the total SD sample and for the total SMP sample.

In other words, the obtained reliabilities are of such a magnitude that each subtest consisting of four items, can be split into two alternate forms each containing two items. This possibility has been anticipated: in the Pilot Study it was decided to maintain four items in each subtest in order to provide two parallel forms.

Table V-4: Split-half reliability coefficients of the Creativity Battery (uncorrected) or: Parallel-form reliability coefficients for two-item subtasts

	N	WB	An	3WS	TC	UU	Co	Or	Total test
SD1	53	.59	.54	.54	.60	..73	.53	.70	.87
SD2	33	.66	.48	.34	.21	.79	.39	.65	.82
SD3	43	.66	.55	.53	.37	.55	.53	.36	.87
SMP1	47	.80	.83	.79	.64	.71	.70	.65	.93
SMP2	50	.62	.81	.63	.51	.71	.59	.60	.87
SMP3	41	.62	.61	.78	.43	.53	.64	.49	.84
SD-T	129	.69	.61	.54	.56	.74	.62	.68	.90
SMP-T	138	.73	.79	.75	.61	.68	.69	.61	.90
SD+SMP	267	.76	.77	.73	.60	.73	.71	.66	.92

It should be noted that neither Torrance (1974) nor Schoppe (1975) calculated splithalf reliabilities with their batteries. Torrance mentioned only interscorer reliability and test-retest reliability studies, Schoppe reported test-retest and parallel-form reliabilities. According to Schoppe the split-half method

is ineffective with creativity tests, because the items are not equivalent.

The results of our study indicate that the split-half method could be used, even with creativity tests, if the items have been selected on the basis of their equivalence, as was the case in this study.

1.1.4. Correlation of subtest-total score (Coefficient of homogeneity)

Product-moment correlations were computed between the subtest-scores and the total battery score. These correlations were calculated for the seven measures of creativity (divergent thinking) and computed for each of the six schools as well as for the total SD sample and for the total SMP sample, and for SD combined with SMP.

The results are presented in table V-5.

Table V-5: Product-moment coefficients of correlation between subtests-scores and the total test score of the Creativity Battery.

	N	WB	An	3WS	TC	UU	Co	Or
SD1	53	.67	.59	.66	.83	.90	.77	.77
SD2	33	.73	.74	.49	.43	.62	.59	.56
SD3	43	.62	.70	.51	.71	.85	.64	.74
SMP1	47	.66	.85	.73	.76	.86	.84	.70
SMP2	50	.55	.69	.73	.70	.76	.67	.73
SMP3	41	.70	.75	.71	.68	.80	.69	.54
SD-T	129	.74	.72	.64	.77	.87	.81	.76
SMP-T	138	.68	.76	.75	.76	.79	.81	.65
SD+SMP	267	.76	.79	.77	.76	.82	.85	.70

At the SD level (for the total SD sample) the coefficients range from .64 to .87; for the total SMP sample the coefficients range from .65 to .81. The magnitudes are high although not as high as the odd-even reliabilities. This was expected, because the subtests have been deliberately selected to represent different aspects of creativity (see chapter IV).

In view of Guilford's S-I model the subtests represent the same operation (divergent thinking) and content (verbal) category, but different products. (Word Beginnings: DMU; Anagram: DMT; Three-Word-Sentences: DMS; Thing-Categories: DMR; Unusual Uses DMC; Consequences: DMI).

Summary: Reliability and homogeneity studies conducted with the Creativity Battery, including interscorer reliability, test-retest, split-half and subtest-total score correlations, show that all the correlation coefficients are significant beyond the .01 level and show a substantial to a very high magnitude.

1.2. Reliability of the convergent thinking and the short-term memory tests

The two convergent thinking tests used in this study are part of the TIKI (Test Intelligensi Kollektip Indonesia) battery, developed by the Subfaculty Psychology of the Vrije Universiteit Amsterdam and the Faculty of Psychology of the Pejajaran University. Reliability and validity studies as well as norm data have been established for use in Indonesia.

In our study an estimation of reliability for the two TIKI tests, Figure Exclusion and Word Relations, have been obtained by the Kuder-Richardson method (formula 21) and were based on subtest-

total score correlations. The same procedure was used for the two short-term memory tests which are part of the IDEA battery developed by the University of Dar-es-Salaam and the Free University of Amsterdam.

Kuder-Richardson reliability coefficients have been computed for each of the six schools as well as for the total SD sample and the total SMP sample, based on the two tests separately. The results are shown in table V-6.

Table V-6: Kuder-Richardson reliability coefficients of the convergent thinking and the short-term memory measures

	N	FE	WR	RN	WM
SD1	53	.30	.72	.85	.79
SD2	33	.59	.73	.51	.95
SD3	43	.50	.63	.65	.91
SMP1	47	.70	.80	.62	.85
SMP2	50	.33	.75	.66	.99
SMP3	41	.66	.73	.57	.78
SD-T	129	.46	.74	.75	.92
SMP-T	138	.60	.77	.65	.89

FE = Figure Exclusion)
WR = Word Relations) Convergent thinking tests

RN = Remembering Numbers)
WM = Word Memory) Short-term memory tests

The reliability of the two convergent thinking tests were also estimated by the split-half (odd-even) method (see table V-7).

Table V-7: Odd-even reliability coefficients of the convergent thinking measures (Corrected for the whole test)

	SD1	SD2	SD3	SMP1	SMP2	SMP3	SD-T	SMP-T
FE	.55	.68	.70	.69	.61	.77	.64	.69
WR	.93	.94	.87	.92	.83	.82	.93	.86

The odd-even as well as the Kuder-Richardson reliabilities of the Word Relations test were generally higher than the reliabilities of the Figure Exclusion test. For Figure Exclusion the average K.R. r = .47, whereas the average K.R. r = .75 for Word Relations. The average odd-even reliability coefficient of Figure Exclusion is .67 and of Word Relations ,90.

Concerning the two short-term memory tests, the reliabilities of the Word Memory test were generally higher than the reliabilities of the Remembering Numbers test. The average K.R. r = .67 for Remembering Numbers, whereas for Word Memory the average K.R. r = .88.

Summarizing, the same trend can be seen concerning the convergent thinking and the short-term memory measures: the semantic tests have higher reliabilities than the non-semantic (figural and numerical) tests.

The semantic convergent thinking measure (WR) as well as the two short-term memory measures show high reliabilities; the reliability for the FE test is slightly less satisfactory.

1.3. Reliability of the School Achievement tests

Reliability studies of the Achievement tests have been conducted by the BP3K in 1975 at the 6th grade level and in 1976 at the 9th

grade level. (see Table of Split-half reliabilities for the 6th grade in chapter IV).

In this study the internal consistency of the Achievement tests were estimated by the Kuder-Richardson formula 21. For each of the six schools the reliabilities were computed for the various subjects separately. For the total SD sample as well as for the total SMP sample the coefficients were computed based on the total achievement score. In table V-8 the results are presented:

Table V-8: Kuder-Richardson reliability-coefficients of the School Achievement tests, based on SD and SMP sample

	N	BI	Mat	IPA	IPS	Eng	Total Sch.Ach.
SD1	53	.70	.73	.57	.71	-	
SD2	33	.77	.64	.56	.78	-	
SD3	43	.71	.53	.46	.69	-	
SMP1	47	.64	.49	.65	.80	.85	
SMP2	50	.66	.75	.68	.77	.80	
SMP3	41	.60	.62	.45	.70	.45	
SD-T	129	.80	.73	.65	.75	-	.91
SMP-T	138	.73	.76	.75	.84	.85	.90

BI = Bahasa Indonesia

Mat = Mathematics

IPA = Science

IPS = Social Science

Eng = English

Tot.Sch.Ach. = Total score of the School achievement test

For the various subjects the reliability coefficients range from .65 to .80 at the SD level, and from .73 to .85 at the SMP level. Based on the total achievement score the reliabilities were of a very high magnitude, .91 resp. .90 at the SD resp. SMP level. The coefficients for the various subjects, though all denote substantial to high relationships, were somewhat lower than the coefficients obtained by the BP3K in their assessment survey in 1975. This is very likely due to the much smaller sample size in this study.

1.4. Reliability of the Creative Attitude Scale

Reliability estimates of the Creative Attitude Scale were obtained based on: - test-retest method

- split-half and odd-even method
- Kuder-Richardson method

Test-retest reliabilities were obtained with an elapsed time of six weeks between the first and second testing.
Correlations were computed between the first half and the second half of the scale, also between the odd and even numbers. The obtained correlations were than corrected for the whole test.
The results are presented in table V-9.

Table V-9: Reliability coefficients of the Creative Attitude Scale, based on 1st - 2nd half, odd-even, Kuder-Richardson 21 and test-retest method, for SD and SMP sample.

	N	split-half (corrected)	odd-even (corrected)	Kuder-Richardson	Test retest
SD1					.37
SD2					
SD3					
SMP1					.68
SMP2					
SMP3					
SD-T	129	.59	.61	.40	
SMP-T	138	.65	.75	.55	

Based on four procedures of reliability testing, the obtained correlation coefficients showed marked relationships, for the total SD sample as well as for the total SMP sample.

In general the reliabilities were higher at the SMP level than at the SD level. This is especially true with the test-retest reliability estimate, .37 at the SD and .68 at the SMP.

The inference is that the scale should be used with some reservation at the elementary level, at least until more robust data are obtained.

1.5. Reliability of the Composition Scoring Scheme

The interscorer reliability of the scoring scheme has been determined in the Pilot Study. Sixty compositions independently

scored by three raters resulted in high reliability coefficients (see Chapter IV).

In the main study interscorer objectivity was tested again, based on 30 compositions (15 of sixth graders, 15 of ninth graders), independently scored by three raters.

The only difference was that in the Pilot Study the scoring was done after a short explanation of the scoring system, without any training, whereas in the main study the raters had been given a short training, in which they simultaneously scored several compositions, then independently scored some other compositions, after which they discussed the results. The positive effect of the training is shown in an increase of the reliability coefficients.

Table V-10: Product moment correlations between three raters of compositions, applying the analytical and the global rating method. (Coefficients of interrater reliability). Main study.

SD (N = 15) a, b, c = raters	r_{ab}	r_{ac}	r_{bc}
Fluency	1.	1.	1.
Flexibility	.89	.91	.90
Originality	.84	.95	.95
Elaboration	.93	.91	.97
Total score	.99	.99	.99
Global rating	.93	.85	.76
SMP (N = 15)			
Fluency	1.	1.	1.
Flexibility	.92	.91	.85
Originality	.86	.85	.86
Elaboration	.74	.67	.94
Total score	.94	.95	.99
Global rating	.88	.85	.74

We also experimented with the global rating method to find out which of the two is more effective, in this respect in terms of objectivity in scoring.

The three raters were given the insturction to rate another set of compositions with respect to creativity, but this time based on a global impression. Criteria of creativity to be used were originality, imaginativeness and richness in ideas. One score was to be given, varying from 5 (very creative) to 1 (not creative at all).

It was found that interrater agreement was also high when using the global rating method (see table V-10), but that with the analytical method the reliability coefficients were generally higher.

2. VALIDATION STUDIES OF THE CREATIVITY BATTERY

Before discussing the relationships of the divergent thinking measures with other intellectual measures (discriminant validity) and with external criteria (convergent validity), as well as the relative contribution of creativity, intelligence and memory in the prediction of school performance, this second section will first present the mean, standard deviation, and range of the divergent thinking measures at the SD and SMP level (table V-11 and table V-12) and thereafter the intercorrelations among the divergent thinking measures (table V-13 and V-14).

2.1. Table V-11: Mean, Standard Deviation and Range of the Divergent Thinking measures at the SD level (N = 129)

Subtest	Mean	Standard Deviation	Range
1. Word Beginnings	23.04	8.25	4 - 49
2. Anagram	16.10	6.15	0 - 32
3. Three-Word-Sentences	11.29	3.95	1 - 24
4. Thing Categories	13.39	5.37	2-- 37
5. Unusual Uses	7.56	5.13	0 - 24
6. Consequences	7.58	4.48	1 - 27
7. Originality	2.74	3.33	0 - 15
Total Test	81.71	28.65	

Table V-12: Mean, Standard Deviation and Range of the Divergent Thinking measures at the SMP level (N = 138)

Subtest	Mean	Standard Deviation	Range
1. Word Beginnings	31.64	9.52	13 - 71
2. Anagram	22.98	8.90	0 - 53
3. Three-Word-Sentences	15.68	5.51	0 - 33
4. Thing Categories	15.79	5.89	2 - 40
5. Unusual Uses	10.11	4.77	1 - 27
6. Consequences	12.38	4.74	0 - 25
7. Originality	4.27	3.70	0 - 23
Total Test	112.86	32.78	

2.2. Table V-13: Intercorrelations among the Divergent Thinking measures. SD - sample (N = 129)

	WB	An	3WS	TC	UU	Co	Or
1. Word Beginnings							
2. Anagram	.68						
3. Three-Word-Sentences	.50	.44					
4. Thing Categories	.51	.33	.42				
5. Unusual Uses	.62	.50	.45	.68			
6. Consequences	.56	.46	.46	.60	.71		
7. Originality	.49	.44	.33	.57	.71	.55	

Table V-14: Intercorrelations among the Divergent Thinking measures. SMP sample (N = 138)

	WB	An	3WS	TC	UU	Co
1. Word Beginnings						
2. Anagram						
3. Three-Word-Sentences	.56	.44				
4. Thing Categories	.55	.41	.54			
5. Unusual Uses	.47	.49	.52	.52		
6. Consequences	.52	.48	.59	.60	.64	
7. Originality	.29	.34	.44	.46	.70	.46

for df = 125, r significant at .05 level : .174
(N-2) .01 " : .228

All the correlation coefficients were significant beyond the .01 level.

At the SD level the coefficients ranged from .33 to .71, for both samples.

At the SMP level the coefficients ranged from.29 to .70.

The average correlation coefficient from the SD sample was .54, while the average correlation coefficient from the SMP sample was .51. (transformation via Fisher-Z scores, Garret, 1961, p. 173).

These magintudes denote a substantial relationship among the diver-

gent thinking tasks (Hypothesis 1.1.). It was anticipated that the intercorrelations would not be very high, because the tests were deliberately chosen to represent different aspects of creative thinking. But we expect that the correlations of the divergent thinking measures with the convergent thinking measures, as well as with the short-term memory measures would be significantly lower as they supposedly represent relatively independent dimensions of intellect (hypothesized).

2.3. Correlations between the divergent thinking and the convergent thinking measures

Table V-15 and table V-16 present the product-moment correlations of the divergent thinking with the convergent thinking measures, table V-17 the intercorrelations among the convergent thinking measures.

Table V-15: Correlation of Figure Exclusion with the divergent thinking measures

Sample	SD1	SD2	SD3	SMP1	SMP2	SMP3	SD-T	SMP-T
N	53	33	43	47	50	41	129	138
1. WB	.42	.31	.03	.42	.03	.01	.24	.27
2. AN	.47	.33	.21	.52	.43	.11	.31	.39
3. 3WS	.12	.18	.08	.36	.21	.02	.02	.23
4. TC	.31	.07	.04	.26	.15	.11	.18	.18
5. UU	.47	.25	.15	.48	.30	.12	.28	.27
6. CO	.47	.24	.09	.41	.19	.11	.27	.19
7. Or	.30	.22	.02	.33	.03	.11	.18	.13

Table V-16: Correlation of Word Relations with the divergent thinking measures

Sample	SD1	SD2	SD3	SMP1	SMP2	SMP3	SD-T	SMP-T
1. WB	.45	.48	.43	.35	.03	.45	.55	.40
2. An	.49	.48	.44	.52	.44	.57	.58	.51
3. 3WS	.36	.23	.26	.18	.40	.39	.40	.36
4. TC	.36	.03	.24	.30	.31	.23	.34	.36
5. UU	.59	.17	.38	.48	.43	.42	.54	.46
6. Co	.64	.59	.26	.48	.30	.39	.63	.45
7. Or	.42	.05	.02	.34	.38	.31	.35	.36

Table V-17: Intercorrelations between the Convergent Thinking tests (Figure Exclusion - Word Relations)

Sample	SD1	SD2	SD3	SMP1	SMP2	SMP3	SD-T	SMP-T
N	53	33	43	47	50	41	129	138
	.57	.45	.33	.48	.32	-.07	.43	.26

The average correlation between the divergent thinking and the convergent thinking measures was .36 for the total SD sample, and .33 for the total SMP sample.

To test whether the difference between the average intercorrelation of the divergent thinking measures and the average correlation of the divergent thinking measures with the convergent thinking measures was significant, we used the t - test(for significance of the difference between two correlation coefficients for correlated samples, Ferguson 1971 p. 171) with the formula:

$$t = \frac{(r_{12} - r_{13}) \sqrt{(N - 3)(1 + r_{23})}}{\sqrt{2(1 - r_{12}^2 - r_{13}^2 - r_{23}^2 + 2r_{12}r_{13}r_{23})}}$$

where r_{12} = average correlation between the divergent thinking tests

r_{13} = " " " " " " and the convergent thinking tests

r_{23} = " " " the convergent thinking tests

For df = 125, a t of 1.98 is required for significance at the 5% level

a t of 2.62 is required for significantce at the 1% level

For the SD sample we found t = 2,30, significant at the 5% level. For the SMP sample we found t = 2.06, significant at the 5% level. Thus the difference between the average intercorrelation of the divergent thinking tests and the average correlation between the divergent thinking and the convergent thinking tests is significant at the 5% level, for both samples, SD and SMP (Hyp. 1.4. confirmed).

The average correlation between Figure exclusion and the divergent thinking meesures was .21 for the total SD sample, and .24 for the total SMP sample, whereas the average correlation between Word Relations and the divergent thinking measures was .48 resp. .41 for the total SD resp. total SMP sample.
Using the t-test to find out whether the difference between the average intercorrelation of the divergent thinking tests and the average correlation between Figure Exclusion and the divergent thinking tests was significant, we found t = 4.14 for the SD sample, which is significant at the .01 level, and t = 2.59 for the SMP sample, which is significant at the .05 level.
However, the difference between the average intercorrelation of the divergent thinking tests and the average correlation between Word Relations and the divergent thinking tests was not significant, with calculated t-values of .79 resp. 1.19 for the total SD resp. total SMP group.

At both levels, SD and SMP, there is a marked relationship between Word-Relation and the divergent thinking measures, most

likely because of the common verbal factor between these two types of tests.

Anyhow, as Crockenberg (1974) pointed out, 'a correlation of .30 to .50 between creativity and IQ scores is not sufficient to reject the usefulness of either the creativity dimension or the particular creativity measure. Even with a correlation of .50 between creativity and IQ scores, 75% of the variance in creativity scores is determined by something other than IQ' (p. 32).

2.4. Relationships of the divergent and the convergent thinking measures with a figural divergent production measure (Circle Test)

The correlation between the two convergent thinking measures was .43 (SD) and .26 (SMP), the average r of .35 denoting a significantly positive (Hyp. 1.2. confirmed) but rather low relationship. This could possibly be explained by the fact that Figure Exclusion and Word Relations have different content categories. The average correlation coefficient of the divergent thinking measures with Figure Exclusion (.21 and .24 at the SD resp. SMP level) was considerably lower than the average correlation coefficient of the divergent thinking measures with Word Relations (.48 and .41 for the SD resp. SMP group.) The most obvious cause of this difference would be that the divergent thinking measures and Word Relations belong to the same content category - while they differ in the operation category. With respect to Figure Exclusion the tests differ in operation as well as in content category.

However, the verbal factor appeared not to be the only communality

between Word Relations and the divergent thinking measures and, accordingly is not the only factor that accounts for the substantial relationships between the two. This is demonstrated by the relationships between a figural divergent productivity measure (Torrance's Circle Test) and convergent thinking and verbal divergent thinking measures (see table V-18).

	CIRCLE TEST					
	I			II		
	SD	SMP	SD+SMP	SD	SMP	SD+SMP
Figure Exclusion	.04	.05	.06	.24	.01	.23
Word Relations	.24	.12	.27	.43	.06	.45
Tot.sc.Creat.	.23	.37	.35	.40	.36	.47
Word Beginnings	.13	.13	.20	.28	.14	.34
Anagram	.15	.27	.28	.25	.32	.44
3-Word-Sentences	.16	.29	.29	.23	.27	.39
Thing Categories	.15	.44	.28	.29	.38	.32
Unusual Uses	.27	.37	.30	.39	.34	.30
Consequences	.26	.29	.31	.46	.37	.42
Originality UU	.14	.43	.28	.22	.42	.29

Table V-18: Product moment correlations of a figural divergent productivity measure (Torrance's Circle Test) with a figural and a verbal convergent thinking measure and with a battery of verbal divergent thinking measures:

I. based on the sumscore of fluency, flexibility and originality of the Circle Test

II. based on the sumscore of fluency, flexibility, originality and bonus originality of the Circle Test.

A look at table V-18 shows most clearly that the correlation coefficient between the Circle Test and Figure Exclusion - although both have figural content- was considerably lower than the correlation coefficient between Circle Test and Word Relations, both belonging to different content categories.

- The correlation coefficients between the Circle Test and the verbal divergent thinking measures (different content categories) were also higher than the correlation coefficient between the Circle Test and Figure- Exclusion (same content category).

- The correlations among the verbal divergent thinking measures (average r = .54 and .51 for the SD resp. SMP group) were higher than the correlations of the verbal divergent thinking measures with the figural divergent production measure, which has been predicted.

- The correlation of the figural divergent production measure with the ideational production measures of the verbal divergent thinking tasks (i.e. Thing Categories, Unusual Uses, Consequences and Originality, although Unusual Uses refer to flexibility and originality in thinking, this test is closer to the capacity to produce ideas, as contrasted to Word Beginnings and Anagram which measure fluency or productivity with respect to words) tend to be higher than the correlations of the figural divergent production measure with the word- respectively expressional fluency measures (the latter also measuring facility with words) of the verbal divergent thinking tasks.

That the word respectively expressional fluency measures can be distinguished (factorially separated) from the ideational produc-

tion measures, and that Word Relations has more in common with the divergent thinking measures than the verbal factor will be demonstrated by the factor analytic studies, to be discussed further on in this chapter.

Summary:

1. The average intercorrelations between the seven divergent thinking measures showed a positive marked relationship for the total SD sample (.54) as well as for the total SMP sample (.51) (Hypothesis 1.1. confirmed).

2. The intercorrelation between the two convergent thinking measure showed a substantial positive relationship at the SD level (.43) and a positive but low relationship at the SMP level (.26). At both levels the intercorrelation is significant at the 1% level (Hypothesis 1.2. justified).

3. The average correlations between the divergent thinking and the convergent thinking measures were significantly positive but rather low at the SD level (.36) as well as at the SMP level (.33).

4. The average intercorrelation among the divergent thinking tests is significantly higher thatn the average correlation of the divergent thinking with the convergent thinking tests (hypothesis 1.4. accepted).

5. The correlation between the figural divergent productivity measure and the figural convergent measure was considerably lower than the correlation between the figural divergent measure and the semantic convergent measure.

6. The correlations between the figural divergent measure and the semantic divergent measures were higher than the correlations between the figural divergent measure and the figural convergent measure, which indicates that the operation category seems to be prevalent over the content category.

7. Conform to the expectations the intercorrelations among the semantic divergent measures were higher than the correlations of the semantic divergent measures with the figural divergent measure.

8. The correlations of the figural divergent measure with the ideational (fluency, flexibility and originality) production measures of the semantic divergent tasks tend to be higher than the correlations of the figural divergent measure with the word- respectively expressional fluency measures of the semantic divergent thinking tasks.

2.5. Is there an IQ threshold for creativity?

The studies of Getzels & Jackson (1962), Torrance (1966), Yamamoto (1965), MacKinnon (1966) and others have shown that there might be a threshold of intelligence, a cut-off point (about a 120 IQ) above which there is almost no relationship between IQ and creativity (see Chapter II).

In the present study the IQ threshold theory has also been explored. Taking the top 20% from the IQ score distribution (sumscore of the two convergent thinking tests: Figure Exclusion and Word Relations) for the total SD as well as for the total SMP sample (26 resp. 28 Ss.) product-moment correlation coef-

ficients were computed between these IQ scores and the corresponding creativity (divergent thinking) scores. We found a correlation coefficient as high as .64 in the SD sample, and as low as .12 in the SMP sample.

Surprised by this unexpected discrepancy, a closer inspection of the data has been made. It was found that the most obvious difference between the two subgroups ('high IQ' group from SD and SMP) lies in the IQ distribution. Whereas in the SD high IQ group, IQ scores ranged from 37 to 54, in the SMP high IQ group the range was much more limited (51 to 56).

This restricted IQ distribution of the SMP sample may well explain the alomost absent relationship between IQ measures and creativity scores, whereas the larger range in the SD high IQ group may be responsible for the high correlation between IQ and creativity measures.

Apart from the score distributions in IQ - after all there is still variance in the SMP samples -the results for the SMP group seem to support strongly the IQ threshold theory, whereas in the SD group even at the higher IQ levels there is still a high correlation between intelligence and creativity.

The inference is that in the present study there is no conclusive evidence to support the threshold theory of creativity. In fact, there may be some justification for Wallach's argument, that at least part of the low relationships between IQ and creativity scores as IQ increases, may be simply a function of the restricted IQ range. On the other hand it could also be that this threshold theory only holds for the higher ages, when the

structure of intelligence has reached a stage of more differential development. The difference in SD and SMP could partly be explained in the light of this hypothesis. More research is needed to clarify on this matter.

Another question is that these findings might throw some light on the quality of the schools. In the SD sample, 62% of the top 20% in IQ group, come from SD Manggarai (SD 1), 23% from SD Taman Harapan (SD 2) and only 15% from SD Tanah Abang (SD 3). In the SMP sample, 54% come from SMP Melawai (SMP 1), 39% from SMP Tebet Utara (SMP 2) and only 7% from SMP Jembatan Batu (although the SMP's were not selected on the basis of quality level).

We also found that if selection (e.g. of the 'best' pupils) had been based on IQ alone (the top 20%), at the SD level 54% of the top 20% in creativity would have been rejected. At the SMP level, 36% would have been excluded. From the top 20% in creativity scores, 50% come from SMP Melawai and the other 50% from SMP Tebet Utara. In the SD sample, 81% come from SD 1, 15% from SD2 and only 4% from SD 3. Thus difference in quality of schools seemed to be stronger indicated by creativity measures than by IQ measures.

2.6. Correlations between the divergent thinking and the short-term memory measures

Table V-19 and table V-20 present the product-moment correlations of the divergent thinking with the short-term memory measures, table V-21 the intercorrelations among the short-term memory measures.

Table V-19: Product-moment correlations of Remembering Numbers with the divergent thinking measures.

Sample	SD1	SD2	SD3	SMP1	SMP2	SMP3	SD-T	SMP-T
N	53	33	43	47	50	41	129	138
1. WB	.17	-.14	.04	.22	.08	-.22	.16	.16
2. An	.21	-.07	.07	.28	.06	-.01	.18	.20
3. 3WS	.17	.02	.10	.33	.24	.07	.18	.30
4. TC	.28	.16	.14	.22	-.11	.03	.30	.12
5. UU	.24	.13	.08	.18	.13	-.11	.25	.09
6. Co	.23	-.07	-.04	.28	.20	.28	.23	.31
7. Or	.24	-.13	.02	.17	.01	-.04	.21	.07

Table V-20: Product-moment correlations of Word Memory with the divergent thinking measures.

Sample	SD1	SD2	SD3	SMP1	SMP2	SMP3	SD-T	SMP-T
N	53	33	43	47	50	41	129	138
1. WB	-.03	.10	.00	.34	.02	.20	.20	.19
2. An	.12	.29	.13	.26	.27	.34	.34	.24
3. 3WS	-.12	.11	-.11	.25	.14	.36	.11	.22
4. TC	-.19	-.11	.17	.25	.20	.09	.08	.23
5. UU	.05	-.21	.13	.17	.36	.34	.20	.30
6. Co	.05	.06	-.00	.19	.38	.38	.24	.32
7. Or	.16	-.19		.17	.10	.43	.20	.21

Table V-21: Intercorrelations among the Short-Term Memory tests (Remembering Numbers - Word Memory)

Sample	SD1	SD2	SD3	SMP1	SMP2	SMP3	SD-T	SMP-T
N	53	33	43	47	50	41	129	138
	.14	-.12	-.04	.45	.07	.04	.09	.16

The average correlation between the divergent thinking and the short-term memory measures was found to be .20 for the total

SD sample and .21 for the total SMP sample, both denote low relationships between these two dimensions of intellectual functioning. Again the t-formula for correlated samples was used to determine whether the difference between the average intercorrelation of the divergent thinking measures and the average correlation of the divergent thinking measures with the short-term memory measures was significant.

The obtained t- values were 3.54 at the SD level and 3.03 at the SMP level. For 125 degrees of freedom a t equal to 2.62 is required for significance at the .01 level. Thus we are justified in drawing the inference that the relationships between the divergent thinking measures were significantly higher than the relationships of the divergent thinking measures with the short-term memory measures (Hypothesis 1.5.).

The intercorrelations between the two short-term memory tests was found to be positive but very low for the total SD sample (.09) as well as for the total SMP sample (.16) (Hypothesis 1.3. not confirmed). A possible explanation for the almost negligible relationship may be found in the fact that both tests belong to different content categories.

Tentative normtables of the Creativity Battery

Based on the total score of the Creativity Battery the standard scores were computed for the Primary and the Junior Secondary level separately. The tables are presented in the Appendix C.

Summary:

1. The intercorrelation between the two short-term memory measures (Remembering Numbers and Word Memory) showed a positive but very low relationship, at the SD (.09) as well as at the SMP level (.16 , Hypothesis 1.3. rejected).
This may be due to the different content matter of the tests.

2. The average correlation between the divergent thinking measures and the short-term memory tests showed a positive but low relationship at the SD level (.20) as well as at the SMP level (.21).

3. The average intercorrelation among the divergent thinking tests is significantly (1%) higher than the average correlation of the divergent thinking tests with the short-term memory tests, for both levels. (Hypothesis 1.5. accepted).

2.7. Relationships of creativity, intelligence and memory with school performance

In this section attention will be given to the relative contribution of creativity, intelligence and memory to schoolperformance. To what extent do measures of creativity, intelligence and memory correlate with standardized tests of schoolachievement? Based on theoretical considerations and research findings as mentioned in literature (chapter II), it was hypothesized that there will be positive and statistically significant relationships between each of these three dimensions of intellectual functioning with schoolsuccess, (Hyp. 2.1, 2.2, and 2.3), as measured by the achievement tests. As to their relative contribution, it was further hypothesized that measures of creativity

as well as of intelligence will be measures about equally effective as predictors of performance in school (Hypothesis 2.4).

2.7.1. The predictive power of measured of creativity, intelligence and memory

Table V-24 presents the product-moment correlations of the convergent thinking, short-term memory and divergent thinking measures with schoolperformance in one composite score. The school-achievement tests at the SD level include Bahasa Indonesia, Mathematics, Science and Social Science, while at the SMP level beside these four subjects, English was also included.

Table V-24: Product-moment correlations of Schoolachievement as one composite score with measures of divergent thinking, convergent thinking and short-term memory, for the total SD and the total SMP sample

	SD (N = 129)	SMP (N = 138)
1. Word Beginnings	.59	.53
2. Anagram	.67	.56
3. Three-Word-Sentences	.39	.46
4. Thing Categories	.35	.57
5. Unusual Uses	.57	.39
6. Consequences	.62	.59
7. Originality	.39	.31
Convergent thinking		
1. Figure Exclusion	.36	.32
2. Word Relations	.76	.59
Short-term memory		
1. Remembering Numbers	.18	.27
2. Word Memory	.42	.25
Composite score of		
Divergent thinking	.68	.63
Govergent thinking	.72	.58
Short-term memory	.46	.32

Significance of r : for df = 125, a r of .174 is required for significance at the .05 level, and .228 at the .01 level (Garret, 1961, p.201).

It is shown that all the correlation coefficients, reflecting relationships of the creativity, intelligence and memory measures with schoolachievement, are significant beyond the .01 level for both samples, except Remembering Numbers for the SD sample, which showed a correlation, significant at the 5% level of significance (Hypothesis 2.1, 2.2. and 2.3 accepted).

Tests of the verbal content category show higher correlations with school-achievement, than tests with non-verbal items no matter whether it concerns intelligence or memory. (Figure Exclusion and Remembering Numbers). Looking at the composite scores, for both samples, memory correlates lowest with schoolperformance; as to creativity and intelligence, at the SD level, intelligence shows the highest correlation, while at the SMP level it is creativity that shows the highest correlation with schoolperformance.

Table V-25 presents the correlation matrix of the composite scores of the divergent thinking, the convergent thinking and the short-term memory measures with the composite score of school achievement.

Table V-25: Correlation-matrix of composite scores divergent thinking, convergent thinking, short-term memory and schoolavhievement; SD and SMP level.

SD	1	2	3
2	.41		
3	.60	.36	
4	.72	.46	.68

SMP	1	2	3
2	.33		
3	.58	.36	
4	.58	.32	.63

1 = composite score convergent thinking tests
2 = " " short-term memory tests
3 = " " divergent thinking tests
4 = " " schoolachievement tests

Significancy of the relationships:

To test whether the correlation between creativity and school-achievement is significantly higher than the correlation between short-term memory and schoolachievement, the t - test was used (for correlated samples).

	SD	SMP
r_{12} = correlation creativity-schoolachievement	.68	.63
r_{13} = " memory - "	.46	.32
r_{23} = " creativity-memory	.36	.36

$$SD: t = \frac{(.68 - .46)\sqrt{126(1 + .36)}}{\sqrt{2(1 - .68^2 - .46^2 - .36^2 + 2x.68x.46x.36)}} = 3.12 \text{ (sign.1\% level)}$$

$$SMP: t = \frac{(.63 - .32)\sqrt{135(1+.36)}}{\sqrt{2(1 - .63^2 - .32^2 - .36^2 + 2x.63x.32x.36)}} = 4.15 \text{ (sign.1\% level)}$$

for df = 125, $t_{.05} = 1.98$

$t_{.01} = 2.62$

The computed t-values show that the correlation between creativity and schoolachievement is significantly higher than the correlation between memory and schoolachievement.

The same procedure was used to test whether the correlation between intelligence and schoolachievement was significantly higher than the correlation between memory and schoolachievement. The computed t-values of 3.93 for the SD sample, and of 3.25 for the SMP sample, both show significancy at the .01 level.

Finally in testing whether the differences in correlation coefficient of intelligence-schoolachievement and of creativity-schoolachievement were statistically significant, we found t-values of .26 at the SD level and of .31 at the SMP level, both indicating differences that were not significant. Thus we are justified in accepting the null hypothesis, that the correlation between measures of intelligence and schoolachievement and the correlation between measures of creativity and schoolachievement are of the same magnitude (Hypothesis 2.4. accepted).

Summary: The six hypotheses that were formulated concerning the relationships of the three dimensions of cognitive functioning (intelligence, creativity and memory) to schoolperformance were all justified by the data in this study. Significant relationships were found between each of these three dimensions of intellect with schoolperformance. Though statistically significant, yet the contribution of memory to success in school seemed inferior to that of intelligence and creativity.

On the other hand, no adequate ground exists in claiming superiority of other intelligence or creativity in their relative contribution to schoolachievement. Some difference appeared between the two educational institutions: whereas at the SD level the trend is for intelligence tests to show the highest correlations with schoolachievement, at the SMP level the trend is for creativity tests to make the highest contributions.

2.7.2. Partial correlations

After having found statistically significant relationships between creativity and schoolachievement and also between creativity and intelligence, what we would like to know is the cor-

relation between schoolachievement and the part of the variance in creativity that is not associated with variance in intelligence. It is of course reasonable to expect that intelligence and creativity will co-vary positively. In problem solving both manifestations of creative ability as well as manifestations of intelligence will be seen. This is also indicated by the correlations found in our study.

It seems desirable, therefore, to partial out the effect of intelligence upon the correlation between schoolachievement and creativity measures, in order to find out the exclusive contribution of creativity to school performance.

To compute partial correlations, we use the equation:

$$r_{12.3} = \frac{r_{12} - r_{13}r_{23}}{\sqrt{(1 - r_{13}^2)}\ \sqrt{(1 - r_{23}^2)}}$$

(Garrett, 1961 p. 407)

where r_{12} = correlation between creativity and schoolachievement
r_{13} = " " intelligence and "
r_{23} = " " creativity and intelligence

For the SD sample, substituting $r_{12} = .68$, $r_{13} = .72$ and $r_{23} = .60$, the partial $r_{12.3} = .45$.

For the SMP sample, substituting $r_{12} = .63$, $r_{13} = .58$ and $r_{23} = .58$, the partial $r_{12.3} = .44$.

These results mean that when the variable intelligence is kept constant, the correlation between creativity and school success is still significant beyond the .01 level and of a substantial magnitude.

The same is true if we compute the partial correlations between

intelligence and schoolachievement. If the effects of variance in creativity is eliminated, a partial $r_{13.2}$ of .53 at the SD level and of .34 at the SMP level is found. From these data we can infer the important conclusion that both creativity and intelligence appear to be independently associated with school-achievement.

This has implications both for the understanding of factors that determine school performence and for practical purposes of predicting this school performance providing a multiple correlation that is higher than each correlation separately.

2.7.3. Multiple correlations

Whereas partial correlations deal with the residual relationship between two or more variables where the common influence of one or more other variables has been removed, multiple correlations deal with the calculation of weights which produce the maximum possible correlation between a criterion variable and the weighted sum of two or more predictor variables. Its purpose is to maximize the efficiency of prediction (Ferguson, 1971).

The question that interests us is:
To what extent do creativity and intelligence in combination contribute to school achievement? How may scores on the two predictors be combined to predict scholastic success?

The commonly used formula for calculating a multiple correlation coefficient is:

$$R = \sqrt{\beta_2 r_{12} + \beta_3 r_{13}}$$ (Ferguson, 1971, p.395)

where r_{12} = correlation between creativity and school achievement
r_{13} = correlation between intelligence and school achievement
r_{23} = correlation between creativity and intelligence

The values of β_2 and β_3 are multiple regression weights for standard scores on creativity and intelligence respectively.

The values of β_2 and β_3 are given by the following formulas:

$$\beta_2 = \frac{r_{12} - r_{13}r_{23}}{1 - r_{23}^2}$$

$$\beta_3 = \frac{r_{13} - r_{12}r_{23}}{1 - r_{23}^2}$$ (Ferguson, 1971, p.394)

Substituting $r_{12} = .68$, $r_{13} = .72$ and $r_{23} = .60$, for the sixth grade
$\beta_2 = .39$ and $\beta_3 = .49$ and $R = .78$

Substituting $r_{12} = .63$, $r_{13} = .58$ and $r_{23} = .58$, for the ninth grade
$\beta_2 = .44$, $\beta_3 = .32$ and $R = .68$.

The results indicate that applying weights to maximize the correlation between school achievement and the sum of scores on creativity and intelligence, tend to increase the efficacy of prediction of scholastic success.

Thus in practice, by combining scores of creativity and intelligence, a better estimate of the criterion, school performance, may be obtained. These results are in the line of Wade's findings (see chapter II).

2.8. Validation studies of the Creativity Battery against criterion measures other than schoolperformance

In the preceding section the empirical data in this study suggest that predictive value can be ascribed to the divergent

thinking measures with regard to schoolperformance, not less than do measures of convergent thinking (or measures of I.Q.) and better than measures of short-term memory.

It has been emphasized (see chapter II) that a multi-dimensional approach (Mac Pherson 1963) or a multi-criterion approach (Yamamoto 1963) should be used in construct validation of creativity measures.

Two criterion measures for creativity have been adopted:

1. the writing of a composition (creative writing ability)
2. teacher ratings of pupils creativity

It has hypothesized that to ascertain the validity of the Creativity Battery, there should be significantly positive relationships between measures of creative thinking performence as measured by the writing of a composition (scored according to the global and analytic method) on the one hand, and with teacher ratings on the other hand. (Hypotheses 3.1., 3.2. and 3.3.).

2.8.1. Composition writing as criterion

Performance in composition writing will be scored according to the global (wholistic) rating method as well as according to the analytical method.

Table V-26 presents the correlations between the divergent thinking measures and scores in composition based on the global method, for the total SD and the total SMP group.

Table V-26: Product-moment correlations between the devergent thinking measures and scores in composition based on the global method, for the total SD and the total SMP group.

	SD (N=129)	SMP (N=138)
1. Word Beginnings	.38	.21
2. Anagram	.32	.31
3. Three Word Sentences	.26	.22
4. Thing Categories	.25	.32
5. Unusual Uses	.40	.38
6. Consequences	.45	.29
7. Originality	.21	.24
Total Score	.43	.37

The correlation coefficients are all significant at .01 level for both samples, except Originality (SD sample) and Word Beginnings and Three-Word-Sentences (SMP sample), all three reaching the 5% level of confidence. This means that hypothesis 3.1. can be accepted.

Table V-27 and V-28 show the correlations between the divergent thinking measures and scores in composition based on the analytical method, for the total SD and the total SMP group.

Table V-27: Product-moment correlations between the divergent thinking measures and scores in composition based on the analytical method, for the total SD group (N=129)

SD (N = 129)	Fluency	Flex.ss.	Flex.C.	Orig.	Elab.	Tot.score
1. Word Beginnings	.28	.05	.35	.42	.13	.38
2. Anagram	.24	.08	.34	.38	.08	.32
3. Three Word Sentences	.29	.06	.10	.26	.07	.26
4. Thing Categories	.19	.03	.07	.31	.07	.25

	Fluency	Flex.ss.	Flex.C.	Orig.	Elab.	Tot.score
5. Unusual Uses	.24	.05	.19	.38	.12	.40
6. Consequences	.38	.00	.13	.34	.07	.45
7. Originality	.19	.08	.19	.37	.08	.21
Total score						.35

Fluency = fluency score of composition (number of words used in composition)
Flex.ss = flexibility in sentence structure (see scoring scheme)
Flex.c = flexibility in content(the use of imagination and fantasy)
Orig. = originality score of composition (see scoring scheme)
Elab. = elaboration score of composition (see scoring scheme)
Tot.score = total score of composition based on analytical method

Table V-28: Product-moment correlations between the divergent thinking measures and scores in composition based on the analytical method, for the total SMP group (N=138)

SMP (N=13-)	Fluency	Flex.ss.	Flex.c.	Orig.	Elab.	Total sc
1. Word Beginnings	.35	.15	.11	.00	.13	
2. Anagram	.35	.15	.08	.05	.08	
3. Three Word Sentences	.43	.15	.08	.01	.00	
4. Thing Categories	.43	.18	.28	.21	.15	
5. Unusual Uses	.35	.24	.28	.24	.12	
6. Consequences	.52	.13	.16	.17	.15	
7. Originality	.29	.18	.18	.09	.02	
Total score					.31	

Based on an analytical scoring system, in which each category is correlated separately with each of the subtests of the Creativity Battery it was found that at the SD level the fluency and the originality measure correlate significantly (.01 level) with the divergent thinking measures.

Flexibility in sentence structure and elaboration (or richness) did not correlate significantly with any of the divergent thinking measures.

Whereas flexibility in content showed significant correlations with Word Beginnings, Anagram, Unusual Uses and Originality. When based on the total score of composition rating, the relationships with the divergent thinking measures were all significant.

At the SMP level, the fluency measure showed significant correlations (.01 level) with all seven measures of divergent thinking, elaboration on the other hand, as was the case with the SD group, did not correlate significantly with any of the creativity subtests. It should be noted that the verbal fluency measures of the creativity subtests did not correlate significantly with flexibility in content (in composition writing), but that the latter did correlate significantly with Thing Categories (which is a measure of ideational fluency), with Unusual Uses (measure of flexibility) and with Originality in divergent thinking. The same trend was found concerning the Originality-score in Composition; its correlation with the verbal fluency measures of the creativity subtests were not significant, whereas its correlations with ideational fluency, flexibility and elaboration were significant.

Contrary to expectations, the correlation of the originality-score in composition
with the originality measure in divergent thinking was not significant, as it was with the SD group. Apparently whatever originality they measure, it was not the same thing, at least not with the SMP group. Originality in the Creativity Battery was assessed in terms of statistical infrequency of response, whereas in the composition originality was related to unusualness of content or style of writing, including a qualitative aspect. It has been

mentioned before (chapter II) that originality can be considered in terms of 1. uncommonness of response, 2. remoteness of associations and 3. cleverness of response (Wilson, Guilford, Christensen 1975).

Flexibility in sentence structure showed significant correlations with Thing Categories (ideational fluency), Unusual Uses (Flexibility) and with Originality in divergent thinking, not with the verbal fluency measures and the elaboration measure of the creativity subtests.

With regard to the total score of the composition rating, the correlations with the divergent thinking subtests were all significant (.01 level).

In general what we can infer from these findings is that based on the total score of the analytical compositon rating, the relationships with the divergent thinking measures were positive and statistically significant, thus supporting the confirmant validity of the divergent thinking measures (Hypothesis 3.2. confirmed).

In constructing the scoring scheme, formal aspects of composition writing as well as the content categories have been considered (see chapter IV). The formal aspects involve sentence structure, subdivided in form of sentence, use of sentence and length of sentence, whereas flexibility in content, originality and elaboration (richness) refer to content. Obviously variance in sentence structure has more to do with linguistic skills and is less related to divergent thinking, as indicated by their non significant relationships with the divergent thinking measures.

The components constituting the elaboration category of composition writing also showed non significant relationships with the divergent

thinking measures. Apparently these variables do not define the kind of thinking processes that are relevant for creative writing. Anyhow, based on the total score of the various components in composition writing, significant correlations with the divergent thinking measures were obtained, indicating that the system as a whole can be used to assess creative writing ability. Yet, if we are thinking about a less elaborate, less time consuming (more efficient) system of scoring, the most relevant categories to be considered seems to be: fluency (or the number of words used in the composition), flexibility in content (involving imagination and fantasy) and originality (i.e. originality in theme, in ending, humor, use of self-invented words, and originality in style of writing).

Comparing the correlational pattern at the SD and SMP level, it became clear that at the SD level no distinction appeared between the word fluency and the ideational fluency measures as to their predictability, whereas at the SMP level the ideational fluency measures seem to be the better predictors of creative performance (significant correlations with flexibility in sentence structure, flexibility in content and originality against the non significant correlations of the word fluency measures with the same aspects).

2.8.2. Teacher ratings as criterion

Secondly, we investigated the relationships between creativity test performance and teacher nominations on pupil's creativity.
At the SD level, the classroom teacher did the rating.
At the SMP level, the rating was done by those teaching the five

subjects included in the achievement tests: Bahasa Indonesia, Mathematics, English, Science and Social Science.

Table V-29 presents the correlation coefficients of teacher ratings with the divergent thinking measures, for the total SD group and for the total SMP group.

Table 5-29: Product-moment correlations of teacher ratings with the divergent thinking measures, total SD and total SMP group.

	SD	SMP			
	Bah.Ind.	Math.	English	Science	Soc.sc.
1. Word Beginnings	.33	.34	.25	.33	.20	.23
2. Anagram	.41	.33	.35	.33	.34	.31
3. Three Word Sentences	.29	.28	.28	.31	.26	.08
4. Thing Categories	.27	.37	.23	.26	.24	.11
5. Unusual Uses	.26	.37	.33	.21	.25	.25
6. Consequences	.28	.42	.23	.26	.21	.18
7. Originality	.12	.27	.31	.23	.21	.20
Total-test-score	.38	.45	.37	.39	.33	.27

Significance of r :	df	.05	.01
	125	.17	.23

The seven divergent thinking measures correlated significantly with teacher ratings on pupil's creativity, for both samples, with the exception of the originality measure at the SD level and Three Word Sentences as well as Thing Categories with ratings of the Social Science teachers. In general the ratings of the Social Science teachers were lowest compared with the ratings of the other teachers, while the Bahasa Indonesia teachers ratings show the highest correlations.

For the SD group, the correlation coefficient between the total-creativity testscore and teacher rating was .38. For the SMP

group the average correlation coefficient between total testscore and teacher rating was .46.

It is a well-known fact that judges often tend to disagree in their ratings, some judges being more generous than others and each having his peculiar response style, e.g. some judges rarely use the extremes in their ratings. In our study disagreement may arise, because each of the teachers has limited information of the pupil to be rated, e.g. the Bahasa Indonesia teacher may see other sides of a pupil than a mathematic teacher, etc. It is therefore desirable to estimate interrater agreement, when different judges rate the same subjects.

Table V-30 presents the intercorrelation of ratings given by the five teachers of each SMP on the same pupils.

Table V-30: Intercorrelation of ratings among 15 teachers of three Junior Secondary Schools.

	SMP1	SMP2	SMP3	Averege r
1. Bahasa Indonesia-Mathematics	.61	.47	.15	.44
2. " " -Science	.46	.48	.18	.39
3. " " Social Science	.47	.45	.36	.43
4. " " -English	.24	.45	.30	.34
5. Mathematics-Science	.70	.68	.43	.62
6. " -Social Science	.51	.39	.28	.41
7. " -English	.23	.58	.34	.40
8. Science-Social Science	.44	.31	.28	.35
9. " -English	.23	.29	.28	.26
10. Social Science-English	.09	.49	.52	.38
Average r	.41	.46	.32	.41

The table shows that there is much variance among different teachers in their ratings on the same subjects. The intercorrelation coef-

ficients range from .09 (almost no agreement) up to .70 (high agreement). It can be seen that agreement is highest between the mathematics and the science teacher, and lowest between the science and the English teacher.

Apparently the extent to which agreement exists between two teachers is a function of the proximity of the field of knowledge they are teaching. This is understandable, because the rater's judgment is based on a limited sample of behavior, and the more these samples of behavior are related, the higher the chance of agreement between the raters.

The field of science seemed to be more related to mathematics (both are exact sciences) than it is to English. On the average there is substantial agreement among junior secondary teachers in their ratings of pupils (average r = .41).

Although the agreement among the teachers is not very high, nevertheless the significant correlations of teacher ratings and the divergent thinking measures support the construct validity of the Creativity Battery (Hypothesis 3.3. accepted).

2.9. Factor analytic studies

It has been mentioned in the preceding chapter (chapter IV p.120 and p.174) that the factor analytic technique was used to find out which factors can be identified from the interrelations between the various variables, and whether the factors fit the underlying theory as set forth in the hypotheses to be tested in the present study.

Factor analysis was carried out separatedly for the total SD and for the total SMP group, using Varimax rotation with Kaiser

Normalization. Eighteen variables were included in the analysis, comprising the two convergent thinking, the seven divergent thinking, the two short-term memory measures, school-achievement as one composite score, the five measures of analytical composition scoring and the composition global score (based on the global rating method).

After inspecting the results of the rotation procedures, for the SD group we finally chose a three factor solution which in our opinion provided the best interpretable results. On the same grounds we chose rotation to four factors for the SMP group. Table V-31 presents the results of the rotation process for the SD group. Factor loadings > .40 have been underlined.

Table V-31: Varimax rotated factor matrix after rotation with Kaiser normalization. SD total sample (N = 129).

Variables	Factor I	Factor II	Factor III
1. Figure Exclusion	.15	.37	.13
2. Word Relations	.38	.72	.16
3. Remembering Numbers	.30	.13	-.06
4. Word Memory	.11	.44	-.07
5. Word Beginnings	.58	.47	.19
6. Anagram	.42	.63	.13
7. Three-Word-Sentences	.50	.22	.15
8. Thing Categories	.79	.06	.11
9. Unusual Uses	.82	.28	.14
10. Consequences	.73	.33	.14
11. Originality	.68	.17	.10
12. School Achievement	.38	.80	.12
13. Composition Fluency score	.24	.09	.55
14. Comp.Flexibility in sentence struct.	-.06	-.02	.61
15. Comp.Flexibility in ideas/ content	-.01	.50	.37

Variables	Factor I	Factor II	Factor III	
16. Composition Originality	.26	.35	.42	
17. Composition Elaboration (richness)	-.00	.02	.64	
18. Composition Global Rating	.23	.36	.60	
Total explained variance (in %)	35.4%	10.9%	7.8%	54.1%

At the SD level rotation to three factors showed striking profiles in all factorloadings. The first factor revealed a cluster of the seven divergent thinking tasks. These are the variables that we have operationalized as 'creative thinking ability'. On the second factor School Achievement and Word Relations have the highest loadings. Combined with the slightly lower loadings on Figure Exclusion and Word Memory, these tasks evidently emphasize a combination of 'Scholastic Aptitude' and the traditional 'intelligence' concept.

The relative high loadings of Word Beginnings, Anagram and the Content-Flexibility score in Composition suggest that these tasks bear also strong reletionships to scholastic aptitude or general intelligence. Word Beginnings and Anagram may be distinguished from the other divergent thinking tasks, in that they measure 'word fluency' in contrast to Thing Categories, Unusual Uses and Consequences which according to Guilford measure 'ideational fluency'. This difference may account for the above mentioned relationship. The high loadings on the third factor refer to the composition variables and can be interpreted as 'creative writing ability'.

Table V-32: Varimax rotated factor matrix after rotation with Kaiser normalization. SMP total sample (N = 138)

Variables	Factor I	Factor II	Factor III	Factor IV	
1. Figure Exclusion	.09	-.06	.13	.45	
2. Word Relations	.33	.11	.26	.49	
3. Remembering Numbers	.38	-.04	.01	.13	
4. Word Memory	.24	.05	.22	.13	
5. Word Beginnings	.44	-.00	.34	.45	
6. Anagram	.35	.06	.29	.61	
7. Three-Word-Sentences	.53	-.02	.47	.21	
8. Thing Categories	.45	.25	.44	.25	
9. Unusual Uses	.14	.27	.83	.30	
10. Consequences	.61	.16	.48	.22	
11. Originality	.14	.13	.69	.16	
12. School Achievement	.57	.28	.10	.60	
13. Composition Fluency score	.65	.35	.18	.03	
14. Comp.Flex.Sentence Structure	.13	.31	.17	-.02	
15. Comp.Flex.in ideas/content	-.01	.68	.11	.02	
16. Comp. Originality	-.04	.78	-.01	.10	
17. Comp.Elaboration (richness)	.13	.56	.05	-.32	
18. Comp.Global Rating	.20	.62	.14	.22	
Total explained variance (in %)	33.4%	12.2%	6.2%	5.9%	57.7%

At the SMP level the first factor is primarily determined by the composition fluency measure, the school achievement tests, and measures of word-, expressional- as well as ideational fluency of the Creativity Battery. We recognize in these variables the 'general verbal fluency'. On the second factor all the composition variables,- except the fluency measure, which has the highest

loading on the first factor - showed loadings above .55. It seems likely that this factor can be interpreted as 'creative writing ability'. Evidently fluency as measured by the number of words used in the composition is related to word-fluency and expressional fluency of the divergent thinking measures.

The third factor showed a cluster of five of the seven divergent thinking tasks. This factor can be readily identified as 'creative thinking ability'. It will be noticed that the two word-fluency measures were not included. Apparently, at the SMP level word fluency is less related to what has been operationalized as 'creative thinking' than ideational fluency does. This is in line with Wallach's (1970) statement in his overall review of correlational and factor analytic studies on creativity, 'that fluency with respect to words seems to have much more in common with general intelligence than with ideational fluency' (p. 1223), while 'most clearly supported as a dimension of individual differences independent from the convergent thinking domain but also cohesive in its own right when one measures it in different ways has been what Guilford defines as ideational fluency' (1970, p. 1223).

In considering the originality and the flexibility concept, according to Wallach (1970), these measures turn out to be more independent of intelligence to the extent that they correlate with ideational fluency.

The subtests with high loadings on the fourth factor were: Word Beginnings, Anagram (measures of word fluency), school achievement and the two convergent thinking measures. Here we find a combination of the clear 'intelligence' cluster with word-fluency and scholastic aptitude.

Thus, in the present study, based on factor analysis, it was found that word fluency was more closely associated with the traditional concept of intelligence than with the kind of cognitive functioning that might be considered as creativity.
Ideational fluency, flexibility and originality on the other hand seamed to define the kind of cognitive functioning that (factorially) can be distinguished from the convergent thinking domain.

Conclusions:

At the primary level the seven divergent thinking tasks, providing measures in fluency, flexibility and originality, emerge from factor analysis, as one construct to be identified as 'creativity' and to be distinguished from the convergent thinking domain.
However, the two word-fluency measures are also related to what has been identified as 'intelligence'.
A third factor could be interpreted as 'creative writing ability.'

At the junior secondary level we see a number of intersting differences as compared to the SD level. The only factor that appeared in an almost identical way was the creative writing ability. The creative thinking ability as such has become a pure ideational fluency factor, whereas the verbal fluency part, which at the SD level had some relationship with scholastic intelligence already, has become separated from creative ability, and is associated with the other verbal fluency indicators, and also with scholastic intelligence.

Whether these differences reflect differences in intelligence and ability structures at the different age levels, or may be due to the nature of the tests or samples will be an interesting

subject for further research.

Anyhow, both at the primary as well as at the junior secondary level, 'scholastic aptitude' as operationalized in the school achievement tests appeared to be more related to 'intelligence' and 'verbal fluency' than to 'creativity' defined as more determined by ideational fluency, originality and flexibility in thinking.

3. VALIDITY OF THE CREATIVE ATTITUDE SCALE

This section concerns the validation studies of creative attitude as measures by the Creative Attitude Scale - its relationships with creative thinking ability on the one hand and with criterion performance (composition and teacher ratings) on the other.

It was hypothesized that there will be a positive correlation between creative attitude as measured by the Creative Attitude Scale and:

- creative or divergent thinking ability as measured by the Creativity Battery (Hypothesis 4.1.),
- creative writing ability as measured by the analytical method of composition scoring (Hypothesis 4.2.),
- creative writing ability as measured by the global rating method (Hypothesis 4.3.),
- teacher rating on pupil's creativity (Hypothesis 4.4.).

3.1. Correlations with the divergent thinking measures

Table V-33 shows the correlation coefficients of creative attitude with each of the divergent thinking subtests and with its total score, for the total SD group (N = 129) and the total SMP group (N = 138).

Table V-33: Product-moment correlations of scores on the Creative Attitude Scale with scores on the Creativity Battery, for the total SD groups (N = 129) and the total SMP Group (N = 138).

	SD	SMP
1. Word Beginnings	.15	.40
2. Anagram	.06	.32
3. Three Word Sentences	.03	.30
4. Thing Categories	.09	.35
5. Unusual Uses	.15	.24
6. Consequences	.07	.37
7. Originality	.21	.14
Total score	.14	.42

At the SD level, creative attitude is significantly correlated only with the originality measure (.05 level).
At the SMP level however it is just the reverse: all divergent thinking subtasks except originality show significant correlations (.01 level) with creative attitude. Also with the total test-score, significant relationships were only found for the SMP group.

3.2. Correlations with the analytical scoring of compositions.

Table V-34 presents the correlation coefficients of creative attitude with various categories of composition scoring and also with the sumscore, for the total SD sample and for the total SMP sample.

The following categories were scored separately to enable an estimation of its effect upon the other variables: fluency, flexibility in sentence structure, flexibility in content, originality and elaboration (for a description of these categories see the scoring scheme).

Table V-34: Product-moment correlations of scores on the Creative Attitude Scale with the composition scored by the analytic method, for the total SD group (N = 129) and the total SMP group (N = 138).

	SD	SMP
1. Fluency	.04	.39
2. Flexibility in sentence structure	.01	.22
3. Flexibility in content	.15	.22
4. Originality	.11	.13
5. Elaboration	.00	.09
Sumscore	.07	.30

Based on the sumscore as well as correlated separately, the various categories of composition scoring do not correlate significantly with creative attitude at the SD level. At the SMP level, the fluency and flexibility measures as well as the sumscore show sifnificant correlations with creative attitude (.01 level) whereas the relationships of the originality and of the elaboration measures with creative attitude are not significant statistically.

3.3. Correlation with the composition scored by the global method.

Table V-35: Product-moment correlations of scores on the Creative Attitude Scale with the composition scored by the global method, for the total SD group (N = 129) and the total SMP group (N = 138).

	SD	SMP
Global score	.16	.26

For the SD group the correlation of creative attitude with the global rathing of composition is not significant. For the SMP group it is significant at the .01 level.

ad 4. Correlations with teacher ratings

Table V-36 presents the correlation coefficients of scores on the Creative Attitude Scale with teacher ratings, for the total SD sample and for the total SMP sample (129 respectively 138 Ss.).

Table V-36: Product-moment correlations of scores on the Creative Attitude Scale with teacher ratings for the total SD (N = 129) and the total SMP group (N = 138)

	SD	SMP
Classroom teacher SD	.17	
Bahasa Indonesia teacher		.29
Mathematics teacher		.18
Science teacher		.19
Social Science teacher		.22
English teacher		.08

At the SD level, the classroom teacher ratings correlate significantly with creative attitude (.05 level).
At the SMP level, all teacher ratings except of the English teachers' correlate significantly with creative attitude. The ratings of the Bahasa Indonesia and the Social Science teacher are significant at the .01 level,of the mathematics and the science teachers at the .05 level.

3.4. Factor Analysis of the Creative Attitude Scale

Based on the intercorrelations among the 30 variables constituting the Creative Attitude Scale, a factor analysis was carried out for the total SMP group. For the SD group factor analysis was not considered desirable because the stability of the Creative Attitude Scale at the primary school level was not sufficiently

warrented in the present study as indicated by the test-retest reliability coefficient (see p. 188).

The rotation took place via the Varimax rotation procedure (Kaiser method, 1958). The results are presented in table V-37.

Table V-37: Creative Attitude ScaleVarimax rotated factor matrix after rotation with Kaiser Normalization. SMP total sample (N = 138).

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Item 01	-.10	.11	.33	-.12	-.05	.05
Item 02	-.04	-.55	-.08	.02	.00	-.00
Item 03	.24	-.14	-.34	.34	.20	-.15
Item 04	.03	.28	.07	-.30	.13	.42
Item 05	.02	-.13	-.09	.06	.44	-.02
Item 06	.33	-.05	-.04	.05	-.05	.03
Item 07	.25	.07	.08	.63	.11	.03
Item 08	-.44	.13	.12	.11	.05	.09
Item 09	.46	-.03	.07	.26	-.14	-.18
Item 11	.38	-.02	.02	.14	-.14	-.11
Item 12	.07	-.12	.51	.21	-.08	-.00
Item 13	.09	-.01	-.21	.45	-.10	.03
Item 14	-.01	.05	.46	-.10	.13	.16
Item 15	-.02	.39	-.00	-.03	.01	.01
Item 16	-.09	-.00	.16	-.01	.55	.17
Item 17	.17	.09	.36	.15	.11	.04
Item 19	.16	-.06	-.31	.12	-.02	-.02
Item 20	.10	.06	-.28	.17	-.08	.12
Item 21	.01	.74	.05	.28	-.02	-.08
Item 22	-.12	-.09	.16	.05	-.01	.26
Item 23	.23	.20	-.26	.14	.11	.34
Item 24	.42	.09	.02	.05	.05	-.00
Item 25	-.11	-.04	.00	.04	-.01	.32
Item 26	.11	-.35	.04	.25	.13	-.11
Item 27	.24	-.06	-.05	.07	-.47	.05
Item 28	.29	.05	-.19	-.03	.02	-.13

	Factor I	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Item 29	.14	.09	-.05	-.31	.29	-.00
Item 30	.40	.18	-.05	.32	.03	.06
Item 31	-.03	-.16	.13	.12	.13	.17
Item 32	-.02	.11	.29	-.11	-.02	.44

Rotation to six factors has been chosen, based on the interpre- tability and the meaning of the emerging factors.

Based on the variables with the highest loadings, the following factors were identified:

Factor I : Conformity
highest loadings on variable (item) 6, 8, 9, 11, 24 and 30

Factor II : Appreciation of phantasy
highest loadings on item 2, 15, 21 and 26

Factor III: Openess to new and unusual experiences
highest loadings on item 1, 3, 12, 14, 17 and 19

Factor IV : Confidence in own ideas/Independence of judgment
highest loadings on item 3, 4, 7, 13, 29 and 30

Factor V : Freedom of expression/Interest in creative activities
highest loadings on item 5, 16 and 27

Factor VI : Flexibility of thinking
highest loadings on item 4, 23, 25 and 32

It will be noticed that these factors cover practically all of the trait dimensions which has been assumed as associated with creative attitude and which underly the selection of the items of the scale (see chapter IV).

Table V-38 shows the eigen values of the factors, and the cummu- lative percentage of the variance accounted for various numbers

of factors. We see that for the chosen 6 factor solution the cummulative percentage of variance is 40.4%.

This means that a good deal of the variance is not covered by the six factors, and that most of the items have an unique independent meaning. However, this does not reduca the usability of the attitude scale, because the scale is utilized not as a series of sub scales, but as one total scale involving various aspects of creative attitude.

Table V-38: Creative Attitude Scale, results of a factor analysis, after rotation(SMP sample, N = 138); indicating the eigen values, and the cummulative percentage of the variance accounted for by the factors.

Variable	Communality	Factor	Eigenvalue	Pct of var	Cum Pct
Item 01	.23	1	3.18	10.6	10.6
Item 02	.41	2	2.29	7.7	18.3
Item 03	.39	3	1.87	6.2	24.5
Item 04	.34	4	1.78	6.0	30.5
Item 05	.29	5	1.56	5.2	35.7
Item 06	.21	6	1.42	4.7	40.4
Item 07	.47	7	1.39	4.6	45.1
Item 08	.30	8	1.27	4.2	49.3
Item 09	.33	9	1.21	4.0	53.4
Item 11	.24	10	1.10	3.7	57.1
Item 12	.37	11	1.05	3.5	60.6
Item 13	.30	12	1.02	3.4	64.0
Item 14	.29	13	.91	3.0	67.0
Item 15	.25	14	.89	3.0	70.0
Item 16	.33	15	.86	2.9	72.9
Item 17	.23	16	.81	2.7	75.0
Item 19	.24	17	.80	2.7	78.3
Item 20	.21	18	.74	2.5	80.8
Item 21	.47	19	.73	2.5	83.3

Variable	Communality	Factor	Eigenvalue	Pct of var	Cum Pct
Item 22	.22	20	.65	2.2	85.5
Item 23	.29	21	.63	2.1	87.6
Item 24	.25	22	.59	2.0	89.6
Item 25	.27	23	.52	1.8	91.3
Item 26	.37	24	.47	1.6	92.9
Item 27	.30	25	.46	1.6	94.5
Item 28	.28	26	.44	1.5	96.0
Item 29	.31	27	.36	1.2	97.2
Item 30	.30	28	.32	1.1	98.3
Item 31	.18	29	.26	.9	99.2
Item 32	.28	30	.24	.8	100.0

Summary:

Concerning the relationships of creative attitude with the Creativity Battery, a striking difference is found between the two samples.

1. At the SD level the correlations of creative attitude with the divergent thinking measures, with creative writing ability as measured by the analytical and by the wholistic method of scoring compositions, and with the classroom teacher ratings on pupil's creativity although positive, denote negligible relationships.
2. At the SMP level there is a substantial relationship between creative attitude and the total score of the divergent thinking measures. The correlations with creative writing ability and with teacher ratings are positive but low. Hyp. 4.1, 4.2, 4.3 and 4.4 are justified only for the SMP group.
3. Factor analysis of the Creative Attitude Scale (CAS) for the SMP group resulted in the following six factors: conformity, appreciation of phantasy, openness to new and unusual experien-

ces, confidence in own ideas, freedom of expression/interest in creative activities and flexibility of thinking. In these factors we recognize the trait dimensions which were claimed to reflect creative attitude and which underly the construction of the CAS.

4. Factor analysis was not considered desirable at the primary level, because the test-retest reliability coefficient of the CAS at this level does not sufficiently quarantee stability of the instrument as assessed in the present study.

4. ANALYSIS OF VARIANCE

This section deals with analysis of variance of the samples under study: the three elementary schools and the three junior secondary schools. The differences between the sample means on all the variables will be analyzed.

With regard to the total SD group as compared with the total SMP group significant differences between the two sample means on measures of creativity (hyp. 5.1.), intelligence(hyp.5.2), memory (hyp. 5.3), creative attitude (hyp.5.4.) and creative writing ability (hyp. 5.5.) are hypothesized.

Two different procedures were followed:

A. To analyse whether significant differences exist among the three SD's, as well as whether significant differences exist among the three SMP's, the F - test was used, involving the following steps (Ferguson 1971, p. 215):

1. Partition the total sum of squares into two components, a within-groups and a between-groups sum of squares, using the appropriate computation formulas.

2. Divide these sums of squares by the associated number of degrees of freedom to obtain s_w^2 and s_b^2, the within- and between-groups variance estimates.
3. Calculate the F ratio s_b/s_w and check in the table of F (Table D, Ferguson 1971, p. 452-455), whether this F ratio reaches the level of significance (5%).
4. If not, the null hypothesis is accepted.

The computed F - ratios are shown in table V-38 (see Appendix D).

B. The schools were also compared in pairs, as follows:

SD1 with SD2	SMP1 with SMP2
SD1 with SD3	SMP1 with SMP3
SD2 with SD3	SMP2 with SMP3

With only two groups to be compared each time, the significance of the differences may be tested using either the t - test (for independent samples) or the analysis of variance. These procedures lead to the same result (Ferguson 1971, p. 218).

For each sample school the means on each of the variables were computed. When the standard error of the means are given we may compute:

$$\sigma_D = \sqrt{\sigma_{M1}^2 + \sigma_{M2}^2}$$

$$\text{and t or CR} = \frac{D}{\sigma_D}$$

σ_{M1} = standard error of the mean of the first sample

σ_{M2} = " " " " " " " second "

σ_D = " " " " difference between the means

D = difference between the two sample means

CR = critical ratio or t - ratio

Table V-39 presents the computed t - values (see Appendix D). The obtained F-values among the three SD's as well as among the three SMP's, showing significance of mean differences on most of the subtests variables indicate that heterogeneity of the samples is sufficiently warranted.

The level of performance of the three SD's conform to the level in school achievement of last years sixth graders, SD1 obtaining the highest means and SD3 the lowest means in school achievement tests in the 1975 National Assessment Survey.

An interesting finding is that whereas among the three SD's as well as among the three SMP's the differences in means in Remembering Numbers are significant beyond the .05 level, when the total SD group is compared with the total SMP group, the differences in means in Remembering Numbers did not reach the .05 level of significance.

The mean of the total SMP group is even lower than the mean of the total SD group (9.88 and 10.59 respectively), although not significantly.

This could mean that rote memory (at least for numbers) does not increase beyond the SD level, and that its functioning is not enhanced by the instructional system, in contrast to convergent thinking and divergent thinking for which significant differences between the SD and SMP level were found. It should be noted that SMP pupils already represent a highly selected population group (see chapter III, only about 10% of the SD school population have access to SMP's), and it is only gratifying that apparently this selection has not favored rote memory to the loss of convergent and divergent thinking.

The fact that no significant difference has been found in flexibility of sentence structure between the two levels of schooling would suggest that the skill in sentence usage and in sentence structuring such as is required in composition writing has been sufficiently developed at the end of the primary school. One would readily admit that the skill to vary form, use and length of sentences is not very difficult, so that not much variance is to be expected between the samples concerning this task (less discriminative power).
The implication would be that 'flexibility in sentence structure' may be less appropriate as a criterion variable for creative writing performance.

Summary of results and testing the hypotheses:

- There is a significant difference (.01 level) in means of each of the subtests as well as of the total score of the Creativity Battery between the total SD and the total SMP sample (Hypothesis 5.1. confirmed).
- There is a significant difference in means of each of the convergent thinking measures as well as of the total score between the total SD and the total SMP sample (Hypothesis 5.2. confirmed).
- There is a significant difference in Word Memory, but no significant difference in Remembering Numbers between the total SD and the total SMP sample (Hypothesis 5.3. partially accepted).
- There is a significant difference in creative attitude as measured by the Creative Attitude Scale, between primary and junior secondary school samples (Hypothesis 5.4. confirmed).
- There is a significant difference in creative writing ability as measured by the analytical method as well as by the global

method of scoring compositions (Hypothesis 5.5. confirmed) between the two levels of schooling, SD and SMP.

- Concerning the different categories in scoring compositions, there is a significant difference in fluency, flexibility in content, originality and elaboration, between the primary and junior secondary schools. There is no significant difference in flexibility of sentence structure between the two samples.
- Among the three primary schools there is no significant difference in means on Figure Exclusion, Creative Attitude Scale and Composition writing based on the analytical as well as on the global rating method.
- Among the three junior secondary schools there is no significant difference in means on Figure Exclusion, Word Memory, Originality in divergent thinking and in flexibility of sentence structure in composition writing.

5. THE IDEAL PUPIL AND THE CREATIVE PERSONALITY

The primary concern of this section is to determine to what extent the characteristics that teachers and parents value in the 'ideal pupil' resemble the 'creative personality' as valued by experts (psychologists) in Indonesia.

The specific hypotheses to be tested in this connection are the following:

- that there will be a highly positive correlation between:

1. teachers' and parents' perception of the ideal pupil
2. primary and junior secondary teachers' perception of the ideal pupil

3. expperts' perception of the creative personality, no matter whether the ratings were obtained by the Q-sort technique or by the usual rating method.

- that there will be a significant difference between:

4. teachers' perception of the ideal pupil and experts' perception of the creative personality

5. parents' perception of the ideal pupil and experts' perception of the creative personality

Analysis of data

The method of data collection and data analysis have been mentioned in chapter IV.

Table V-40 presents the correlation matrix of the ratings of teachers and parents on the ideal pupil and the ratings of experts (psychologists)on the creative personality.

Table V-40: Correlation matrix of the ratings of teachers and parents on the ideal pupil and the ratings of experts on the creative personality.

	1	2	3	4	5	6
variable 2	.93					
" 3	.94	.99				
" 4	.93	.97	.97			
" 5	.95	.97	.97	.98		
" 6	.93	.96	.96	.97	.98	
" 7	.59	.65	.65	.58	.62	.60

1 = primary school teachers (N = 33)
2 = junior secondary school teachers (N = 69)
3 = primary + junior secondary school teachers (N = 102)
4 = parents from primary school pupils (N = 45)
5 = parents from junior secondary school pupils (N = 88)
6 = parents from primary and junior secondary school pupils (N = 133)
7 = psychologists (staff of the Faculty of Psychology, university of Indonesia, N = 30)

The correlation between teachers and parents rating is .96 (very high), hypothesis 6.1 is confirmed.

The correlation between primary and junior secondary school teachers is .93, which is very high (hypothesis 6.2 confirmed).

The correlation between teachers rating and experts rating is .65; although this denotes a substantial relationship, it is significantly different from .96, the correlation between teachers and parents rating. It is also significant different from .94, the correlation among teachers rating. (Hypothesis 6.4 confirmed).

The correlation between parents rating and experts rating is .60; although again there is a marked relationship, yet its magnitude is significantly different from .96, the correlation between teachers and parents rating and it is also significantly different from .98, the correlation among parents rating (Hypothesis 6.5. confirmed).

Rank differences:

The correlations between the rankings by experts (Q-sort) and the rankings by psychologists, teachers and parents, computed by the rank-difference method are presented below.

Substituting for N = 60 (number of items in the checklist), we found:

rho = .94 between rankings from psychologists and the Q-sort psychologists

rho = .48 between rankings from teachers and the Q-sort psychologists

rho = .43 between rankings from parents and the Q-sort psychologists

Thus hypotheses 6.4, 6.5 and 6.6 are justified.

Means and ranking of characteristics

The means of the characteristics in the Ideal Pupil Checklist as rated by teachers, parents and experts are listed in table V.41 (Appendix E). The ranking of the characteristics as rated by teachers, parents and experts are listed in the tables V-42, V-43, V-44 and V-45 (Appendix E).

Torrance used his Ideal Pupil Checklist to find out what teachers and parents in various cultures consider an ideal personality.

Subjects of his study were teachers and other educators from five rather distinct cultural groups, tested in their own countries in their own native languages: the United States, Germany, India, Greece, and the Philippines. They were given the Ideal Pupil Checklist to check the characteristics they consider desirable resp. undesirable in their pupils. Transformed into a Q-sort, the Checklist was also rated by a panel of ten judges, all of whom had had advanced graduate courses in personality theory, to describe their concept of the 'ideal' creative personality.

The ratings of the ten experts were combined by adding the ratings received by each item, and ranking the items on the basis of these values.

In the USA the composite rankings of a sample of 264 teachers correlated .95 with the composite rangkings of another sample of 583 teachers. Correlations were also creculated for the composite rankings of the sample of 583 teachers and for a sample of 257 parents with the expert sort for the Creative Personality. In both cases, coefficients of correlation of .42 were obtained.

The extent to which the values of each of the five different cultures conform to creative values as measured by the expert sort of the Creative Personality can be obtained by examining the coefficients of correlation between the composite ratings of each culture with the expert sort. These data are shown in table V-46. Our own data as found in the present study has been added:

Table V-46: Coefficients of Correlation between teacher ratings of six different cultural groups with Q-sort ratings of experts on Creative Personality.

Cultural groups (Teachers)	Number	Coefficient of Correlation
United States	264	.51
Germany	93	.47
India	375	.35
Greece	94	.32
Philippines	147	.30
Indonesia	102	.48

The data obtained in Indonesia are quite similar to Torrance findings: while teachers among themselves highly agree on what should be honored in a child (r=.93; in the USA .95), and also teacher ratings correlate .96 with parents ratings, their perceptions are quite different from what has been considered a 'creative personality' by Q-sort experts (r= .48 and .43 for teachers and parents respectively). In other words, the characteristics that teachers and parents favored in a child do not reflect the creative personality, and as teachers and parents consciously or unconsciously reward behaviors in terms of their own ideals, the implication is that their behavioral goals for children would barely be in the line where it can be expected that creativity will be nurtured,

or will be given much opportunity to be developed or to express itself.

The rankings of characteristics by teachers, parents and experts (see Appendix E) provide information of the cultural values which encourage and discourage creative behavior.

Teachers conception of the ideal pupil described a healthy, courteous and industrious person, who remembers well and does his work on time. Motivational traits, such as persistent, self-confident, energetic and being a self-starter are also favored. Although factors of motivation do play a significant role in creative productivity, however, this profile bears very little resemblance to the creative personality as conceived by experts. Of the ten most favored characteristics by teachers, only two are among the ten characteristics considered most important in a creative personality by experts (Q-sort rate), self-confidence and a self-starter.

Parents seemed also to favor an industrious, courteous and healthy person. They highly honored obedience and sincerity, and like teachers, they gave great regard to motivational traits. But again, the characteristics they mostly desired in a child do not reflect the creative personality profile. Only two characteristics (self-confidence and a self-starter, the same two characteristics as with teachers) were among the ten characteristics most favored in a creative personality by the experts (Q-sort rate).

As compared with the ratings of the sample of thirty psychologists, teachers' priorities included four of the ten most creative characteristics, most belonging to the motivation dimension: energetic, a self-starter, self-confident and courageous in convictions. But

such characteristics as: imaginative, independent in thinking, curious, adventurous and willing to take risks, which make up the creative personality were not preferred by teachers. The same is true for parents.

These data strongly suggest that the educational climate in Indonesia is not very conducive to the development of creativity in children.

To get an impression of how different cultures value creative behavior, a list of the ten most favored characteristics by teachers of five different cultures as found in the Torrance study (1965), followed by the ten most favored characteristics by Indonesian teachers, as found in the present study, will be presented.

United States	Germany	India
Independent in thinking	Sincere	Curious
Curious	Sense of humor	Obedient
Sense of humor	Industrious	Does work on time
Considerate of others	Independent in thinking	Courteous
Industrious	Attempts difficult tasks	Healthy
Receptive to others ideas	Independent in judgment	Self-confident
Determination	Curious	Self-starter
Self-starter	Self-confident	Industrious
Sincere	Healthy	Affectionate
Thorough	Adventurous	Determination
Greece	**Philippines**	**Indonesia**
Energetic	Industrious	Energetic
Strives for distant goals	Obedient	Self-starter
Thorough	Courteous	Self-confident
Sincere	Healthy	Courteous
Nonconforming	Considerate of others	Industrious
Remembers well	Does work on time	Does work on time

Greece	Philippines	Indonesia
Healthy	Self-confident	Healthy
Altruistic	Remembers well	Courageous in convictions
Self-confident	Willing to accept judgment of authorities	Remembers well
Courteous	Affectionate	Persistent

Indonesia's teachers stand together with Greece in emphasizing 'energetic'. They resemble the teachers from Greece and the Philippines in giving an appropriate degree of emphasis to 'courteousness'. All cultures except the United States appreciate 'self-confidence'. All cultures without exception emphasize being 'industrious'. Not one stresses 'independent in judgment, becomes absorbed and preoccupied with tasks, intuitive and willing to take risks', behaviors which are typical for those who made outstanding creative contributions to society.

6. PERSONAL AND ENVIRONMENTAL (HOMEBACKGROUD) FACTORS

This section reviews some personal as well as environmental factors which may influence the child's cognitive functioning as reflected in various psychological tests used in this study and in his educational performance.

More specifically, the questions that concerns us here are e.g. What are the influences of age, sex, a child's position in his family etc. on his scores in creativity, intelligence, memory and school-achievement-tests? Are there any differences in a pupil's performance depending on the educational level of his parents? What are the effects of parental attitudes on a child's performance?

An analysis of the correlations between the various tests (particularly the Creativity Battery) and these personal and environmental factors also provide more information about the meaning of the tests.

The following variables have been analyzed:

1. age of the pupil
2. sex of the pupil
3. number of children in the family
4. taking private lessons
5. the education of the father
6. the education of the mother
7. language at home
8. amount of hours spent in doing homework
9. a place to study at home
10. parents asking about homework
11. parents assisting in homework
12. number of books at home
13. newspaper subscription
14. television at home
15. leisure time activities
16. correction of speech by parents
17. stimulating the child to read by parents
18. reaction of parents to a good schoolreport
19. parents asking about schoolwork
20. rules at home (only for the SD sample)

The variables 7 - 20 were adopted from the Questionnaire developed by the BP3K.

The above mentioned variables will be analyzed separately for the total SD and the total SMP sample.

For each of the variables the number and percentage of subjects belonging to the subgroups of the variables under study will be reported.

For each of the subgroups means, standard deviations, variance and the standard error of the mean have been computed for the sumscore of:

1. the Creativity Battery
2. the intelligence (convergent thinking) tests
3. the short-term memory tests
4. the school achievement tests
5. the composition, rated by the analytical method

The standard error of the means have been computed to enable calculating t - velues when required. But for practical reasons, only the means and standard deviations will be reported in this chapter.

Concerning the personal and environmental variables and their relationships with the testvariables, no hypotheses were formulated, as this part of the study is primarily exploratory by nature.

1. Sex differences

As mentioned earlier, in some Asian-African countries as well as in some Western countries girls were found to perform significantly lower on creativity measures than boys. What would be the pattern in Indonesia? Is it true that girls have fewer opportunities to express themselves creatively than boys?

Table V-47 shows the means and standard deviations of the total test scores calculated for male and female students from elementary

and junior secondary schools (see Appendix F). On all test variables comprising tests of intelligence, memory, creativity, school achievement and composition writing no significant differences in means for male and female students were found, at the SD level as well as at the SMP level.

These results are gratifying because they indicate that in our culture, at least in a metropolitan city as Jakarta and with respect to the school population, girls are not 'discriminated' as compared to boys. However, it is quite possible that in remote and rural areas, the differences between the two sexes will be more pronounced and presumably in favour of the boys.

The Grade Six National Assessment Survey (BP3K, 1976b) found a high degree of uniformity between the sexes in every subject tested. But it has been assumed (as only 43% of the sample are girls) that a larger proportion of girls have dropped out of school before grade six and it has been hypothesized that 'if academic ability was an important reason for dropping out, then it is certain that an analysis on a younger age group would show relatively higher means for boys then for girls' (1976b, p. 37). The accuracy of this point of view is still questionable, as the strong selection that took place at the end of the primary school (only about one out of ten SD students continues to SMP, see chapter III) does not affect the proportion of the sexes in the school population: in the present study of the grade six sample, 54% were boys and 46% were girls. Of the grade nine sample 51% were boys and 49% girls. Standardization and validation studies with the TIKI-T (Test Intelligensi Kollektip Indonesia-Tinggi) involving a sample of 936 University

and IKIP students also reveal minimal differences between the sexes in performance on eleven subtests (1976). The sample group is composed of 49.6% male and 50.4% female students.

2. Achievement scores by age of students

Age of the students in our sample reflect firstly the age at which the child entered school and is, secondly, also related to the extent to which he had repeated a school grade.
Assuming that in a metropolitan city as Jakarta each child goes to school at six years or at most at seven years, we could accept that age here is more related to the frequency in which he had repeated a school grade. This on the other hand is affected by both his mental abilities and by environmental factors.
The age range of sixth graders is from 11 - 15 years.
The age range of ninth graders is from 14 - 18 years.
Inspection of table V-48 (see Appendix F) shows indeed that the younger the child in a grade, the higher his achievement. This holds for both levels of schooling.
To find out the significancy of the differences in mean total test scores between age groups at the SD level, we have pooled the 11 and 12 years age groups (N=76) to be compared with the pooled 13, 14 and 15 years age groups (N=53). At the SMP level the 14 and 15 years age groups (N=72) were compared with the 16, 17 and 18 years age groups (N=65).

The pooled mean is calculated by the formula:

$$\hat{M} = \frac{N_1 M_1 + N_2 M_2 \ldots + N_x M_x}{N_1 + N_2 \ldots + N_x}$$

(Hays, 1963; p. 209)

For any number J of independent samples, the corresponding unbiased estimate of σ^2:

$$\text{est.}\sigma^2 = \frac{\Sigma N_j s_j^2}{(\Sigma N_j) - j}$$ (Hays, 1963; p.210)

Thus the pooled variance of three independent subsamples is:

$$s^2 = \frac{N_1 s_1^2 + N_2 s_2^2 + N_3 s_3^2}{N_1 + N_2 + N_3 - 3}$$

The significancy of the difference between the two sample means is computed using the formula (for independent samples):

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{N_1} + \frac{s_2^2}{N_2}}}$$

where $\bar{X}_1 - \bar{X}_2$ = the difference between the means

and $\sqrt{\frac{s_1^2}{N_1} + \frac{s_2^2}{N_2}}$ = the standard error of the difference between the means (Ferguson, 1971; p.152)

The values of t required for significance at the .05 and .01 level can be obtained by looking at table B (Ferguson, 1971; p. 450). For the computed t values and their levels of significance see table V-49a and b.

Table V-49a: T values indicating significance of the differences in mean scores of two (pooled) age groups at the sixth grade

	11 & 12 years N = 76		13,14 & 15 years N = 53			
	Mean	Variance	Mean	Variance	t	p
1. Intelligence	32.50	60.12	26.03	51.43	4.90	.001
2. Rote memory	20.73	21.02	17.52	34.98	3.34	.01
3. Creativity	91.20	940.32	68.07	362.05	5.28	.001
4. School-ach.	181.90	515.70	157.18	477.68	6.22	.001
5. Composition	6.47	8.80	6.16	4.34	.70	n.s.

Table V-49b: T values indicating significance of the differences in mean scores of two (pooled) age groups at the ninth grade

	14 & 15 years N = 72		16,17 & 18 years N = 65			
	Mean	Variance	Mean	Variance	t	p
1. Intelligence	44.77	55.70	40.85	68.60	2.90	.01
2. Rote memory	20.30	18.41	19.44	23.79	1.10	n.s.
3. Creativity	118.03	1102.42	107.53	1067.03	1.90	.05
4. School-ach.	230.66	1805.48	217.45	1396.49	1.93	.05
5. Composition	9.48	8.29	8.31	9.01	2.38	.01

At both levels of schooling the younger age group obtained significantly higher mean scores on all total test variables, except in composition writing at the SD level, and in rote memory at the SMP level.

3. Number of children in the family

The size of the family and its relation to the intellectual achievement of the child has been a subject of numerous investigations. Both Busemann (1930) and Postma (1929) concluded that the

oldest children in a family achieve the best results. But one has to take into account the socio-economic status of the family, as well as the cultural background. According to Busemann for the middleclass in western culture the optimum number of children in a family is about three. In the lower class however the only children are the best achievers. The interest in possible relationships between order of birth and mental abilities dated back to Galton's study on the developmental histories of Geniuses. Galton and after him Havelock Ellis came to the same consludion that the firstborns and the lastborns share a substantial proportion of the geniuses. In small families it is the firstborn while in big families it is the lastborn who excels.

The bigger the family, the stronger the influence of mutual rivalry, and the stronger the stimulant to achieve (Van Krevelen, 1952). Hurlock (1972) in her review of studies on ordinal position and on family size, found that middle, later-born, and only children are likely to be more creative thatn the firstborn, because 'the firstborn is subjected to greater pressures to conform to parental expectations than those born later - pressures that encourage the child to be a conformer rather than a creator. An only child is spared many of the parental pressures common in homes where there are siblings and is also given opportunities to develop individuality' (p. 321).

As to family size, 'children from small families, other conditions being equal, tend to be more creative than children from large families. In large families, authoritarian child-training controls and less favorable socioeconomic conditions are more likely to prevail and militate against the development of creativity' (p. 321).

In our study (see table V-50 in Appendix F) it was found that in the SD group the only children achieve highest scores in measures of intelligence, creativity and school achievement. With regard to intelligence and school achievement the means of only children are significantly higher than those of children from larger families. With regard to creativity, only for the group of children from families with 7 - 10 children the difference in means reached the .05 level of significancy. Between the other subgroups the differences in means are not significant.

At the SMP level, no significant differences were found between the means of only children and the means of children from larger families. To compare the performance of children from small-size families with those from large-size families, the first two subsamples were combined, and likewise the three last subsamples were combined. The differences in means between these two groups were then calculated.

The computed t values indicate no significant differences in performance of children from small-size and children from large-size families, at the SD as well as at the SMP level.

In the National Assessment Survey conducted by the BP3K in 1975, it was found that, contrary to the findings in most countries, the children from large families achieve better in school than those from small families. However, the BP3K questionnaire asked for the number of people and the number of children in the house, not exclusively the ownborn children of the parents, as we did.

In Indonesia it is customary for the well-to-do families to support their less fortunate relatives in asking them to join their household. According to the BP3K one possible explanation of the advantage shown

by children from larger families is to be found in the concept of the extended family in Indonesia (BP3K, 1976b). Another explanation is the traditional custom of 'Gotong Royong', to cooperate in work and play. The expectation that the only child would then be at a disadvantage was not confirmed in our study. But again, we were primarily interested in the size of the 'nuclear' family.

4. The effect of private lessons

Nowadays there is a tendency in Indonesia on the part of the parents to have their children attend private lessons after school hours. This may reflect an insecurity that their children do not get the proper and required amount of knowledge at school. Another possible reason is the desire to give their children the best opportunities in the increased competition for entrance to the next higher level of education. This increased competition is due to the shortage of the higher educational institutions. To find out whether there is any effect of attending private lessons on the child's achievement level, we included this variable in the questionnaire. Table V-51 (see Appendix F) shows the means and standard deviations in total testscores of groups taking private lessons and groups who do not. At the SD as well as at the SMP level no significant differences in means between the two groups were found on all test variables. There seemed to be no relationship between attending private lessons and scores in intelligence, memory, creativity, school achievement and composition writing. Contrary to parental expectations, attending private lessons does not seem to affect the student's performace level. However, it should be noted that there are several factors underlying this variable: on the one hand the economic ability of the parents to

afford their children to attend private lessons, their interset and concern to provide optimal educational opportunities for their offspring, or their insight that their child needs extra lessons after school hours, on the other hand the child's intellectual abilities as well as his motivation to achieve. The brighter or the more industrious student without private lessons perform just as well, or may be better, than the less bright or the less motivated student. These factors may neutralize each other, resulting in non significant differences in performance of those who do attend private lessons and those who do not.

A striking difference is found between the two levels of education in percentage of children who participate in private lessons. At the SD level 60% against 16% at the SMP level are attending private lessons.

5. The educational level of the father

The children were asked to state the level of parental education according to the following classification:

1. Master Degree (Sarjana)
2. Bachelor Degree (Sarjana Muda)
3. Senior Secondary School (SLTA)
4. Junior Secondary School (SLTP)
5. Primary School (SD)
6. Not graduated from Primary School

Because many of the children could not specifically state their parents' educational level, they were given a letter for their parents to provide the necessary information.

The results are presented in table V-52 (see Appendix F).

The general trend is that the higher the educational level of the father, the higher the mean scores of the children. But among the three highest levels no significant differences were found. Particularly at the SD level a clear drop of the mean scores is seen after the third highest level in father's education.

However, one should be very cautious in drawing any inferences because of the incomparable and inadequate sample sizes, particularly at the extremes.

To overcome this difficulty, the three highest levels of parental education were pooled together making one group, and the three lowest levels were also pooled constituting a second group. The pooled means and pooled variances of the two groups were calculated. To determine the significance of the difference in mean scores of children with varying educational background of the parents, we used the t-test to compare children's performance whose parents obtained an SLTA (senior secondary school) certificate or higher with the performance of children whose parents' educational level were not higher than SLTP (junior secondary school).

Table V-53a: T values indicating significance of the differences in mean scores of two independent samples of sixth graders (SD), related to educational level of the father:

	SLTA (N = 62)		SLTP (N = 30)			
	Mean	Variance	Mean	Variance	t	p
1. Intelligence	32.91	77.24	27.49	53.22	3.13	.01
2. Rote Memory	21.39	2033	17.36	35.16	3.30	.01
3. Creativity	93.77	969.94	78.59	295.56	3.01	.01
4. School.ach.	184.14	546.69	168.89	608.63	2.82	.01
5. Composition	6.59	8.62	5.89	5.13	1.29	n.s.

Table V-53b: T values indicating significance of the differences in mean scores of two independent samples of ninth graders (SMP), related to educational level of the father

	SLTA (N = 83)		SLTP (N = 50)			
	Mean	Variance	Mean	Variance	t	p
1. Intelligence	43.73	58.73	41.25	75.88	1.67	n.s.
2. Rote Memory	19.84	24.98	19.85	18.25	.01	n.s.
3. Creativity	114.89	1070.1	109.71	1125.10	.87	n.s.
4. School.ach.	229.72	1654.85	212.98	1502.04	2.37	.05
5. Composition	9.29	6.22	8.32	10.29	1.79	n.s.

The results show that at the SD level, the differences in means are significant with respect to intelligence, memory, creativity, and school achievement, but not to composition writing. At the SMP level however, the differences are not significant, except in school achievement.

Related to the educational level is the type of occupation of the child's father. The BP3K survey used this variable as an index of socioeconomic advantage and its influence on a child's achievement has been assessed. Jobs were classified in ten main categories: professional, civil servants, Armed Forces, pensioners, clerical, skilled labourers, farmers, salesmen, unskilled labourers and unclassified jobs.

The results showed that the children of Armed Forces personnel achieve at the highest levels, closely followed by the children of professional workers and civil servants (BP3K 1976b). Children of unskilled labourers, farmers and unclassified groups performed significantly lower.

A possible explanation for the high means of the Armed Forces category might be found in the fact that an exceptionally high proportion of these children are found in urban, private schools and at the highest economic status levels.

6. Educational level of the mother

Several authors (Domino, 1975; Galton, in Vernon, 1973) stress that the mother is of primary importance in determining the achievement level as well as the scientific career of children, since she has more opportunities than the father to influence the children's psychological growth. It is the mother who teaches them the basic skills and stimulates them toward an intellectual attitude. She may teach them either to accept without questioning whatever is presented by elder or authoritative persons or an attitude of inquiry.

In our study of the relationships between mother's educational level and the child's achievement, the same general trend was found as with father's educational background: the higher the educational level of the parent, the higher the mean score of the child.

The picture was however not always consistent, and the very small sample sizes at the extreme groups make any further comparison impossible (see table V-54 Appendix F). Again we pooled the three highest and the three lowest levels of mothers' education respectively in order to be able to calculate t values indicating significance of the differences in mean scores or the test variables (see table V-55 a and b).

Table V-55a: T values indicating significance of the differences in mean scores of two independent samples of sixth graders (SD), related to educational level of the mother

	SLTA (Senior Sec.) N = 43		SLTP (Junior Sec.) N = 50			
	Mean	Variance	Mean	Variance	t	p
1. Intelligence	33.20	64.52	29.81	77.77	1.95	.05
2. Rote Memory	21.18	22.85	19.99	22.08	1.21	n.s.
3. Creativity	99.16	974.75	81.39	570.93	3.04	.01
4. School.ach.	187.36	488.91	172.81	623.43	2.97	.01
5. Composition	6.80	7.71	6.11	8.03	1.19	n.s.

Table V-55b: T values indicating significance of the differences in mean scores of two independent samples of ninth graders (SMP), related to educational level of the mother

	SLTA (Senior Sec.) N = 48		SLTP (junior Sec.) N = 80			
	Mean	Variance	Mean	Variance	t	p
1. Intelligence	44.79	58.62	41.46	63.84	2.34	.05
2. Rote Memory	20.51	22.26	19.53	18.59	1.18	n.s.
3. Creativity	125.43	1093.57	105.78	937.18	3.32	.01
4. School.ach.	238.19	1742.31	216.65	1565.73	2.89	.01
5. Composition	9.86	7.50	8.60	9.83	2.40	.05

It is interesting that mother's educational level seemed to be stronger positively related to a child's performance than that of the father and this accounts for both levels of schooling. Only in rote memory (and at the primary level also in composition writing) the differences in means do not reach the significancy level of 5%. Apparently, as it is the mother who is more involved with the child's

daily behavior, the mother's level of education will be of primary importance in affecting the child's performance.

7. Language usage at home

The majority of the students (83%), at both SD as well as SMP levels use Bahasa Indonesia at home (see table V-56 in Appendix F). In general, children from homes where local or mixed language is spoken, perform just as well (no significant differences) as those who speak Bahasa Indonesia at home. Obviously, the kind of language spoken at home bear no relevance to the child's performance level. With regard to school achievement, these findings are conform to the results of the National Assessment Survey on grade six (BP3K, 1976b).

8. Amount of time spent in doing homework

One factor which could influence achievement is the amount of time spent in doing homework. The pupils were asked to estimate how much time they spent on homework every day. The responses were classified in four categories: from less than half an hour to over two hours (see table V-57 in Appendix F).

At the SD level a condistent trend is seen that the highest scores on all five test variables were obtained by those who spent one to two hours every day in making their homework. But no significant differences are found between those working more than two hours, those working one to two hours, and those working half an hour to one hour (the subsample working less than half an hour was too small to be included in the analysis), except in creativity tasks the mean of the group working one to two hours was significantly higher (.05 level) than the mean of the group working half an hour to one hour daily.

At the SMP level 65% of the students spent one to two hours in doing their homework. There are however no significant differences in performance between those spending two to three hours, one to two hours and less than one hour respectively in homework, except with regard to school achievement: the differences in means between those working one to two hours and those working less than one hour is significant at the 5% level. The subsample working more than three hours was too small to be included in the analysis.

Anyhow, interpretation of this variable should be considered in the light of, firstly, the accuracy and objectivity of the students in estimating the time spent in doing homework (we do not have data to rate the reliability and validity of these estimates); secondly, two factors may be responsible for the time spent on homework: his intellectual ability on the one hand (the more bright students need to do less homework) and his need to achieve on the other (being positively related to both amount of homework and school performance).

In the light of these two factors it is not surprising that (at the SD level) a moderate level of homework is related to the highest level of school performance.

9. A private place to study at home

At the SD level the students were asked whether they had a good place, a reasonable place or no good place to study; at the SMP level whether they had a private place to study, or whether they have to share it with others or whether they used to study at a friend's home.

The data shows (see table V-58 in Appendix F) that a private place to study appeared not to be essential: with exclusion of the sub-

sample of the sixth graders who claim to have no good place to study (N=2) and the subsample of the ninth graders (N=6) who used to work at their friend's home, because of their too small size, it may be said that no significant differences in performance were found between the subgroups on all five test variables.

10. Parents asking about homework

A factor which one would expect to influence achievement is parental interest in terms of frequency of supervision on student's homework (see table V-59 in Appendix F). At the SD level, the general trend is seen (except in composition writing) that children of parents who show much interest in homework of their children perform better on the test variables than children of parents who only occesionally pay attention to their children's homework.
The differences in means are however not significant.
At the SMP level, no significant difference in rote memory and in composition writing is found between children of parents who always, occsionally, or never ask about homework.
Surprisingly, in intelligence, creativity and school achievement, the relationship appeared to be reversed: mean scores are highest when there is no supervision at all, and lowest when parents always ask about their children's homework. With regard to intelligence, significant differences are seen between scores of students whose parents are always asking and students whose parents never ask about homework, and also between scores of students whose parents always ask and students whose parents only occasionally ask about homework. With regard to creativity, all relationships between the three

subgroups are significant. With regard to school achievement, the difference is significant between students who always get parental supervision, and those who never get any supervision.
Apparently, at the junior secondary level, autonomy in doing homework is positively related to performance, and a 'close supervision' attitude on the part of the parents seems to have a reversible effect on achievement.
However, it is also possible, that much supervision of parents is given to those children who actually need it because they are less bright, and that their lower ability accounts for the lower performance on the test variables.

11. Parents assisting in homework

Whereas the previous variable is related to the degree of interest and supervision of parents on childrens' homework, the present variable reflects the amount of assistance children receive from their parents in doing homework.
Most of the children (76% respectively 59% at the SD and SMP level, see table V-60 in Appendix F) occasionally get parental assistance. Whereas 11% of the sixth graders never receive any help from their parents, at the SMP level the percentage is much higher (33%). However, at this level students who never get parental help in doing homework, perform just as well as those who occasionally, or those who always receive help (no significant differences in mean scores). At the SD level significant differences in mean scores in creativity, school achievement and memory were found for those who occasionally and those who never get help from their parents. With regard to

school achievement there is also a significant difference in means of those who always and those who never receive any help from parents side in doing homework.

Interesting is that in composition writing those who always got help from their parents perform significantly lower than those who only occasionally receive parental assistance.

At the SD level, the general trend is that children occasionally assisted in homework perform better than those for which help is always or never given. For ninth graders there is no difference on performance level, between those who get help always, occesionally or never.

12. Number of books at home

According to the BP3K: 'This variable is both a reflection of the literacy level of the family, and a potential cause of differences in achievement' (1976b,p. 34). It reflects reading interest (next to financial resources) of the family. The students were asked to estimate how many books there are at home: no books at all, one to ten books, eleven to twenty books, or more than twenty books (see table V-61 in Appendix F). At the SD level the number of books in general correlate positively with scores on all five test variables, the more books at home, the higher the scores. Dichotomizing the total group in two sub-groups: those possessing not more than ten books (N=42) and those having more than ten books at home (N=79), the computed t values for the mean testscore differences (3.42, 5.39 and 2.93 respectively) indicated significant difference beyond the .01 level in intelligence, creativity and school achievement. In rote memory and in composition writing the differences are not significant.

At the secondary level no significant differences appeared except in intelligence (t=2.42) between those having more and those having less than twenty books at home (the subgroup having less than ten books at home was excluded from analysis because of the very small sample size).

13. Newspaper subscription

Another variable which reflects reading interest (next to socio-economic class) of the family is the frequency with which newspapers are being bought by the family. At the SD level those who have a newspaper subscription or who often buy newspapers, score significantly higher in creativity and in school achievement, as compared to those who do not have newspaper subscription or who seldom buy any. (see teble V-62 in Appendix F.).
At the SMP level it is consistently seen, that the more the family is engaged in reading newspapers, the higher the scores on creativity and school achievement, although the differences in means do not reach the .05 level of significancy, except in school achievement between those who have a regular newspaper subscription and those who only occasionally buy newspapers.

Several of the environmental variables we have mentioned are indirect measures of the socio-economic status of the family, such as whether the child has a private place to study, the number of books at home, whether newspapers are often bought, whether there is television at home and to a certain extent the leisure time activities. Studies in other countries show that the economic status is strongly related to school achievement (BP3K 1976b).

BP3K conclude from its assessment survey that children from homes with a rich supply of material facilities achieve at a much higher level than those from poorer homes. It would be informative to find out how these variables relate to the child's other mental abilities, such as measures of intelligence, rote memory and creativity.

14. Television at home

In a metropolitan city such as Jakarta apparently the great majority of the school population- 81% of the SD group and 88% of the SMP group- (see table V-63 in Appendix F) have television at home. At the SD level this group shows significantly higher scores on all test variables except memory. At the SMP level however, children with television at home show no significant differences in test performance as compared to those without television at home. The fact that only ten percent of the SD population progresses to junior secondary education (see chapter III)- which means that SMP students already represent a strongly selected population- may account for this difference between the two levels of schooling: within the strongly selected SMP population the role of television on the child's intellectual performance is not relevant any more, as it was at the primary level.

15. Leisure time activities

What,if any, are the relationships between type of leisure time activities and the child's performance level? At the SD level the data suggest (see table V-64 in Appendix F) that among the leisure time activities, 'talking and playing' and 'reading' are associated

with higher scores in intelligence, creativity and school performance, while 'listening to the radio', and 'watching television' result in lower scores on the same variables. Those who spent their leisure time primarily in 'listening to the radio' score significantly lower in intelligence, creativity, school achievement and in composition writing than those who spent their leisure time in 'talking and playing' and in 'reading'. But the differences in means between 'talking and playing' and 'reading' are not significant.

Significancies were not calculated with regard to 'reading the Qur'an' and to 'watching the television' because the subsamples were too small. To those in the field of education who prefer a utilitarian approach in spending leisure time and who may regard 'talking and playing' as a useless activity, we like to refer to Rogers (1954) who emphasize the ability to play spontaneously with ideas, colors, shapes, relationships as a condition within the individual most clearly associated with creativity, and to Wallach & Kogan (1965) who insist that a playful, permissive attitude, free from valuational pressures is very important in eliciting creative behavior.

At the SMP level those who spent most of their time in reading, achieve significantly higher scores in creativity, intelligence, school achievement and in composition writing than those who have to help their parents.

16. Correction of speech by parents

At the SD level most of the parents tend to correct their children's speech occasionally (52%), while 37% force them to speak correctly (see table V-65 Appendix F). Only 3% of the parents leave

the child free in speaking. Inspection of the data at this level shows a consistent trend that scores on all five test variables tend to be higher when the parents only occasionally correct the child's speech as contrasted to the parents forcing the child to speak correctly (although the differences in means are not significant). At the SMP level there is a consistent trend that mean scores on all five test variables are highest when the parents leave the child free in speaking and lowest when parents force the child to speak correctly, as was the case at the SD level. The majority of the parents, 60%, tend to correct children's speech occasionally.

These findings are very important in that they support the theories of Barron (1955) that creativity flourishes where suppression is at a minimum, and that creative persons are more independent, self-assertive and dominant (also Torrance, 1965), and of Rogers (1954) that creativity will be nurtured in a non-authoritarian climate, which allows the individual freedom of expression.

17. Parents stimulating the child to enjoy reading

At the SMP level there is a tendency for encouraging children to read to be correlated inversely with scores in intelligence, creativity and composition writing. Students whose parents never stimulate them to read achieve highest scores, while students from parents who very often do so, perform lowest on these three variables (see table V-66 in Appendix F). The differences in means are however not significant, neither at the SD nor at the SMP level. The inadequate sample size of those who were never stimulated to read render this finding further uninterpretable. Of course it is quite

possible that it is the less bright child that has to be stimulated to read. It is also conceivable that parents although they do not consciously or overtly stimulate the child to read, may well indirectly motivate them to enjoy reading by giving a good example or by providing the material facilities. Anyhow, the results are in accordance with the learning theories that intrinsic motivation is the more effective incentive than extrinsic motivation.

18. Parental reaction to a good report

The students were asked to rate how their parents would react toward a good school report: with praise, with a gift, or would they not give any reaction. Which of these three alternatives is most conducive to high performance on the test variables?

At the SD as well as at the SMP level, praise appears to be the most effective type of reaction on a good report. (see table V-67 in Appendix F).

At the SMP level the lowest scores in intelligence, memory, creativity and school achievement were obtained by the group whose parents gave them money or a gift. Only 10% of the parents from SMP students reacted by giving a reward against 27% at the SD level.

We know that those incentives will strengthen behavioral change (i.e. 'learning') which provide the most need satisfaction or which has an important goal value for the child (MacDonald, 1959). We expect that as a student matures, he will be less motivated by extrinsic rewards, and more by intrinsic values. Apparently, the need for approval by parents is felt as a stronger motivating force than getting a reward or a gift.

19. Parents asking about schoolwork.

This variable is related to the variables 'parents asking about homework' and 'parents assisting in homework' in that they indicate the degree of parental interest in and supervision on a child's school performance. The students were to state whether their parents often, occasionally or never ask about schoolwork.

Table V-68 (see Appendix F) shows the means and standard deviations of total test scores related to parents asking about schoolwork. At the SD as well as at the SMP level no significant differences are found between means of groups whose parents often asked about schoolwork, and of those whose parents only occasionally do so. The subsample of children whose parents never ask about schoolwork was not considered in the analysis because of its inadequate small size. Here again we have to reckon with the possibility of the neutralizing effect of two forces underlying this variable: the child's intellectual ability and intrinsic need for achievement (not requiring stimulation from the parents) on the one hand and the stimulation of parental supervision in cases where it is needed on the other hand.

20. Rules at home

This variable also bears relationship to the extent to which parental supervision and discipline is exercised. Only data at the SD level are available. In most families (56.5%, see table V-69 in Appendix F) several rules reigns the house, while in 42% of the families there are many perceived rules.

The consistent trend is for lower scores on all five test variables to occur with many rules at home. The subsample of children reporting

that there are no rules at all at home was too small to be considered (N = 2). The total test scores of children disciplined by many rules are significantly lower than the scores of children with only several rules at home. This is true for all test variables except rote memory. The differences in means in creativity and school achievement even reach the .01 level of significancy. In other words, creativity or intellective performance in general are better developed in a not too restricted climate, with only few rules of conduct and a lack of fear of dissent.

Summarizing, it has been found that the social economic conditions of the family show strong relationships with the child's performance level on the test variables; those with better material and educational facilities are in a more advantageous position.

The learning theories that intrinsic motivation is a more effective incentive than extrinsic stimulation, find support in the results of this study, especially at the higher school level (SMP).

The results also confirm the theories in which creativity is conceptualized as the opposite of authoritarianism (Gowan, 1967b), that creativity is a manifestation of the full functioning, self-actualizing individual (Maslow, 1959), and that creativity is fostered in a non-authoritarian climate, which permit the individual freedom of thinking and of expression, and where the source of evaluative judgment is internal (Rogers, 1973).

Chapter VI

DISCUSSION AND PERSPECTIVES

1. INTRODUCTION

It has been stressed by many authors that testing for creativity is a complex matter. Firstly there is the complexity of creative potential it self. Creative disposition is made up of many components. Within that concept primarily the divergent thinking abilities are included, but other cognitive abilities, like convergent thinking, transformation and even memory are also involved, as well as attitudes, temperamental and motivational traits. Secondly, the criterion variables against which the creativity measures will be validated, are also factorially complex.
The most satisfactorily route in the search for creativity seem to be a multi dimensional and multi-criterion approach.

In the present study an attempt has been made to attack the problem under different perspectives. A battery of creative thinking abilities have been developed, as well as a Creative Attitude Scale, and a scoring system to assess creative writing ability. The study has been carried out on two different samples: sixth graders and ninth graders, to find out whether age differences or difference in school type have influence on measures of creative performance, their interrelations, and their relationships with other cognitive measures. For purposes of discriminant validition two convergent thinking measures ('intelligence') and two short-term memory measures have been included. Besides composition writing (to be assessed on criteria of creativity), teacher total ratings of pupil's creativity were used as external criteria for the creativity measures (confirmant validity). Standardized achievement tests, to be correlated with measures of creativity,

intelligence and memory, were to provide a measure for concurrent validity, but at the same time to allow us to make inferences about the educational system (inverted diagnostics, Hofstee, 1969).

The relation of a number of personal and enviromental variables with the test instruments were expected to provide more information about the creativity concept. And last but not least, teachers' and parents' perception of the ideal pupil have been compared with experts' conception of the creative personality order to give an impression as to what extent educators in Indonesia perceive and reward creativity.

2. THE CREATIVITY BATTERY

The selected six subtests include three'word-fluency'measures and three 'ideational fluency'measures(one of which also provides a measures of originality), to allow a comparison in terms of their effectiveness in the identification of creative potential. Each subtest is assumed to measure different aspects of creative thinking. Word Beginnings and Anagram are measures of word fluency, but the latter involves a process of breaking down and restructuring; Three-Word-Sentences is a measure of expressional fluency. Thing Categories provides a measure of ideational fluency, Unusual Uses provides two measures: one of flexibility and one of originality, whereas Consequences provides a measure of ideational fluency combined with elaboration.

The first three tests are classified as measures of 'word fluency', while the last three tests are classified as mesures of 'ideational fluency'.

In terms of Guilford's SI-model they share the common operation (divergent) and content (semantic) category, but with different products. Hence, we expected substantial degree of interrelatedness among these tasks, which at the same time are expected to maintain a varying and sometimes reasonable degree of uniqueness.

2.1. Internal and trait consistency of the divergent thinking measures

We found an average intercorrelation of .54 and .51 at the primary and junior secondary level respectively, showing a satisfactory degree of internal coherence. All 42 intercorrelations were significant beyond the .01 level.

In other words, the divergent thinking measures appear to cohere, despite their differences, as a relatively unified dimension.

Trait consistency

To determine the trait consistency across measures,

1. correlations were run between trait measures within one test, in our case between the flexibility and originality score of the Unusual Uses task. We found correlation coefficients of .71 and .70 at the SD and SMP level, respectively.
2. Correlations were also run within traits but across tests, in this case, the fluency scores across the four verbal divergent subtests: Word Beginnings, Anagram, Three-Word-Sentences and Thing categories (Unusual Uses provides measures in flexibility and originality, whereas Consequences a combination of fluency and elaboration)
   We found an average correlation of .49 at the SD level, and of .51 at the SMP level.

Studies by Harvey et al (1970, see chapter II) produced a mean correlation between traits of .54, and a mean within trait correlation of only .27. In the Crockenberg study (1972, see chapter II), fluency scores across seven verbal creativity tests resulted in an average correlation coefficient of .42, about the same magnitude as found in our study.

Harvey's correlation coefficients are considerably lower (this could be due to the difference in total variance between his and our samples), but they show the same trend as we found, namely that correlation between traits measures are significantly higher than the correlations within traits but across tests.

Concerning the intercorrelations among the word-fluency mesures as compared with the intercorrelations among the identional fluency measures there is a tendency for the ideational fluency mesures, to show somewhat stronger interrelations than the word fluency mesures.
At the SD level, the average intercorrelation of the word fluency tests and the ideational fluency tests were .56 and .67 respectively. At the SMP level, the intercorrelations were .51 and .55 respectively.
This is in accordance with Wallach's (1970) conclusion, 'that the concept of ideational fluency may be paradigmatic for the kind of cognitive performance that is maximally cohesive in itself' (p. 1221). That it is also 'maximally distinguishable from convergent thinking' is demonstrated by our factor analytic studies.

2.2. The Dimensionality question

The average correlation between the divergent thinking and the convergent thinking measures was .36 and .33 for the total SD and the total SMP sample respectively, significantly lower than the average intercorrelation among the divergent thinking measures conform to expectation.
Thus, Wallach's (1970) argument 'that the divergent measures have little variance in common apart from the variance that they also share with the convergent thinking domain' has been refused in this study.
With word Relations however (verbal convergent) the correlations were

.48 and .41 for the SD sample and the SMP sample respectively; these magnitudes, while still lower than the intercorrelations among the divergent thinking tests, denote substantial relationships, and the differences in correlation with the intercorrelations among the divergent thinking tasks were not significant, whereas with Figure Exclusion and with the sumscore of the two convergent thinking tests the differences were significant.

The data with the Circle Test (see Chapter V) suggest that the substantial relationships between Word Relation and the divergent thinking tasks is not merely a question of the common verbal factor between these two dimensions, for the correlation coefficients between Circle Test (figural)and Word Relations (semantic) were higher than the correlation coefficients between Circle Test and Figure Exclusion (both figural).

Ribot (1906, in Torrance, 1965) and others after him have emphasized the capacity of thinking by analogy (what is measured by Word Relations) as the essential, fundamental element of creative thinking. He maintains that the process of analogizing gives rise to the most unforeseen and novel combinations. This could mean that Word Relations have more in common with the divergent thinking measures outside the verbal factor.
Furthermore, recognizing the fact that creative processes call upon verbal facility to some extent, and verbal facility is a very basic element of the general intelligence concept (Wallach & Kogan, 1965), it is reasonable to expect substantial relationships between the two.

The dimensionality question has stimulated many investigators to design experiments, testing instruments and testing conditions in which minimum correlations with conventional measures of intelligence could be demonstrated, after which they claim success in isolating a dimension that is independent

of general intelligence and that can appropriately be labeled as 'creativity'. Apart from the fact that various studies have failed to support such a sharp differentiation, low correlations are often a matter of homogeneity of the samples (such as has been found in the 'high IQ group' of the SMP sample in the present study), or could be explained by the low reliabilities of the instruments (Thorndike,1963).

Another line of reasoning which should be seriously considered is this: In any creative problem-solving activity, it is of utmost importance in the first place for the mind to be able and to feel free to go off in different directions (divergent thinking) thus allowing to generate many ideas and to formulate a variety of hypotheses; but it has to be followed by a stage of a critical selection of the most appropriate alternative or solution (convergent thinking) and finally by the stage of evaluating the results. This is what Stein (1963) mentioned as: 'Creativity is a process of hypothesis formation, hypothesis testing and the communication of results' (p. 218).
Authors proposing the use of divergent thiking tests, claim that they measure something different from the conventional intelligence tests.
They are right, but on the other hand, it can not be denied that there is some overlap, and we think that it could not and should not be otherwise.
According to Anastasi and Schaefer (1971),

> 'Creativity', like....'intelligence' refer to loosely defined broad, and many faceted concepts.....
> Neither corresponds to a precisely defined or distinct entity.
> Each comprises a multiplicity of identifiable traits, organized in a pattern of relationships that cuts across the two domains'(p,115).

Convergent thinking though perhaps not the most important- is one of the prime determinants of creative excellence. As Cronbach (1970) states:

'Divergent production is of little value and may even interfere with intellectual work if it is not accompanied by good convergent thinking; there is no merit in a fluent outpouring of unrealistic, uncritical ideas' (p. 397).

2.3. The threshold of intelligence

The 'threshold of intelligence' question has been left open in the present study (see Chapter V). The results of the SD sample did not present evidence to prove the threshold hypothesis. The results of the SMP sample may well support it, but it needs further verification since the low correlation between creativity and intelligence at the higher levels of intelligence might have been due to the restricted range in intelligence scores. Further explorations on this matter are needed, particularly in view of its educational implications. If selection is based only on traditional measures of intelligence, which emphasize convergent thinking, an important part of the children with creative potential would have been exluded.

2.4. Validation against external criteria

The validity of the Creativity Battery as based upon relations with adopted external criteria (composition writing and teacher nominations on pupils' creativity), seems to find some positive support in the present study.

2.4.1. Composition writing as criterion

Based on the global as well as on the analytic method of scoring, the correlation between the divergent thinking measures and the composition total scores were all significant without exception, and at both levels of schooling. Based on the global method of scoring, the correlations with the total score of the Creativity Battery are substantial at the SMP level. (.43 and .37 respectively).

With the total score using the analytic method of scoring, the correlation coefficients were .35 and .31 at the SD and SMP level respectively. Considering the great comlexity of creative potential itself (stressed by Guilford, 1971; MacPherson, 1963, Yamamoto, 1965b; and others) -outside the divergent production abilities, other intellectual abilities and also a number of temperamental and motivational traits are also involved-one can hardly expect substantial or high validity coefficients between a small number of divergent thinking measures and a criterion that is also factorially complex.

Many authors found that tests of divergent thinking abilities lack significant correlations with other assumed indicators of creative performance (Guilford, 1971). In this respect the results of our validation studies are certainly not disappointing.
Concerning low validity coefficients, Cronbach (1970) stated: 'If a criteria can be predicted only with validity 0.20, the test may still make an appreciable practical contribution' (p. 135).

We already emphasized the need of a multi-dimensional and a multi-criterion approach in the case of creativity validation (Chapter II).

A different picture emerges when the Creativity Battery is validated against the different aspects of creativity as assessed by the analytic scoring method. At both levels, remarkable correlations were obtained on the fluency score (the number of words used in the composition).
Against originality in composition, at the SD level all creativity subtests show remarkable correlations, but at the SMP level only the three ideational fluency mesures. The low correlations of the word fluency meaaures with orginality in composition may be due to heteroscedastic relationships

between test and criterion (it would need further investigations to clarify on this matter).

Another explanation would be that at the SMP level the ideational fluency measures seem to be better predictors of creative performance, particularly with regard to originality in composition writing.

The studies of Maltzman (1960, in Cronbach 1963) suggest that originality is largely a matter of attitude or mental set, and according to Cronbach, attitudes are influenced by experiences. Feeling free to give a'wild' response is most important. In general the originality scores in compositions writing were very low at both levels as indicated by the low means (.42 and .98 at the SD and SMP level respectively, as compared to the maximum possible score in originality of 5 points).

The same trend is seen that at both levels, SD and SMP, the average correlations between the ideational fluency tests and the global composition score are higher than the average correlations of the global composition score with the word fluency measures (.36 and .32 respectively at the SD level; .35 and .25 respectively at the SMP level).

2.4.2. Teachers nominations as criterion

With regard to teacher nominations as criterion, the validity of the divergent thinking measures are also reasonably satisfactory. Of the 48 validity coefficients, 45 were significant beyond the .05 level, with an average correlation of .38 at the SD level, and .36 at the SMP level.

Yamamoto (1965b) found values of correlation coefficients between creativity tests and nomination measures around .20 and this seems to correspond well with the results of other validation studies.

At the SD level the average correlation of the word-fluency measures with teacher ratings tend to be higher than the average correlation of the ideational fluency measures with teacher ratings (.35 and .27 respectively).
At the SMP level the opposite is true (.32 and .39 respectively).
This likely reflects the nature of the judgement of the teachers, and the priorities they give to the different elements in the creativity rating.

In chapter II the limitations of teacher nominations as predictors of creativity have been discussed. Teacher ratings were found to be more useful as predictors of academic achievement, they also seem to be more able to evaluate creative products such as drawings and writings.
On the other hand, according to Wallach's (1970) review, the word fluency measures seem to have much more in common with general intelligence and school achievement, and he found that measures of ideational fluency were the better predictors of creative performance.
It is quite possible that when teachers were asked to rate their pupils' creative ability, they unconsciously judged the pupils in terms of their scholastic achievement, at least to a certain degree, and this could explain the relative higher correlations of the word fluency measures with teacher nominations at the SD level. At the SD level we have to rely on the judgments of one teacher, the classroom teacher, while at the SMP level each student was rated by five teachers.
Criterion information should possibly be obtained from more than one source.

It has been said that tests of creativity have little construct validity as indicated by their lack of significant correlations with other assumed indicators of creative performance. It is obvious that the contrary has been proved with the present study.

All in all, the reliability as well as the construct validity of the creativity Battery in terms of internal consistency of the divergent thinking measures, the discriminant validity with respect to measures of cenvergent thinking and short-term memory, and the confirmant validity with composition writing and teacher nominations, has been satisfactorily demonstrated in the present study.

2.5. Results of Factor Analysis,

The factor analytic procedure based on the correlation matrix of the divergent thinking, convergent thinking, short-term memory, school achievement and composition measures, confirmed the earlier results of the correlational analyses, providing a clearer picture of the divergent thinking construct.

Obviously, among the creativity measures, a distinction has to be made between the word fluency and the ideational fluency measures.
At the primary level all of the seven divergent thinking measures emerged as one cluster, identified as 'creativity', yet the two word fluency measures (Word Beginnings and Anagram) had also high loadings on the factor 'intelligence' or 'scholastic aptitude'. At the junior secondary level the picture becomes more pronounced: the cluster identified as 'creative thinking ability' does not involve the two word fluency measures; these seem more related to 'intelligence' and to 'scholastic aptitude'.
Wallach (1970) and Thorndike(1963) even go as far as suggesting that word fluency should be banished from the divergent thinking domain.
Bereiter (1960) in his study on verbal and ideational fluency in superior tenth grade students, found no clear warrant for viewing verbal and ideational forms of fluency as having much in common psychologically.

The factor analytic results and the significant correlations found

in our study between the 'divergent thinking' and 'convergent thinking' tests (although significantly lower than the intercorrelations among the divergent thinking tasks) indicate that both can not be conceptualized as two mutually exclusive types of intellectual processes.

As stated by Krause (1972),

> "Es gibt keinerlei Anhaltspunkte fur zwei Arten intellektueller Prozesse. Die Gegenüberstellung zweier substantiallierter Konstrukte ist dem gegenwärtigen Stand der Theorienbildung kaum mehr angemessen" (p.106)

Furthermore, the results support the view that creativity is a multidimensional construct.

2.6. Creativity and intelligence as predictors of school performance.

It was also striking that in all of the six schools measures of creative thinking ability and of intelligence have been found equally efficient in predicting school performance, and both definitely superior to measures of rote memory. Even if the variable intelligence is kept constant, the relationship between creativity and school achievement is still significant beyond the .01 level and of a substantial magnitude (.45 and .44 at the SD level and SMP level). The same is true for intelligence if the effect of creativity is eliminated. The efficacy in predicting scholastic success is even enhanced when measures of intelligence and creativity are used in combination (multiple correlations of .78 and .68 at the SD and SMP level respecvely). Such outcomes have certainly their merits for educational practices.

These findings are also very important in that they throw some light on the educational system, as represented by the six schools.
The data suggest that at least in the schools in our sample searching for creative solutions as well as convergent critical reasoning has been more

stimulated and encouraged and seem to determine school performance more than sheer memory.

These results are the more surprising, considering that according to the 1974 National Survey Report, teaching and learning at the primary as well as at the junior secondary schools has been described as to emphasize routine skills and rote memorization (see chapter III).

Of course it should be kept in mind that the sample schools were confined to Jakarta, and may not even be representative of Jakarta, let alone for the whole of Indonesia, of which 80% is rural.

It is quite possible that the correlational pattern as found in the present study would be different in schools located in remote rural areas which lack the facilities and stimulants of a metropolitan city.

We have to admit that this study is not typical for the whole of Indonesia and should possibly lead to further investigations in other urban as well as non urban areas of the country, but from the point of view of the importance of fostering creativity in education, these are hopeful results.

It should also be kept in mind that although creativity and inteligence have been found to be major predictors of school achievement, considering the the correlational magnitudes (.68 and .72 at the SD level, and .63 and .58 respectively at the SMP level), these data are saying nothing about the absolute level of performance.

It is quite possible that the correlational data reveal emphasis on both creativity and intelligence, in favor of rote memory, but the level of divergent thinking may be low. We are not in the position to draw any inferences on this matter, because comparative data are not available (e.g. cross-cultural studies) yet the rather low means on most of the

divergent thinking test variables (as compared to the means obtained with similar type of tests as reported in test manuals and in other studies in the USA) give an impression of the rather low level of performance. E.g. on the subtest consequences where the subjects are requested to think of all possible consequences of hypothetical events, the shortened time limit of four minutes per item(the original time allowance was five minutes per item, conform to the limits set abroad for this type of test)still seemed too long for our pupils; they did not use the time effectively, but seemed exhausted after 2-3 minutes. In Torrance (1974) norms-technical manual, the mean of fifth graders (N= 112) on the 'Just Suppose' test (which is just another name for Consequences) was 7.80 for one item; whereas in our study, the mean for the sum score of four items was 7.58 at the primary level (or 1.90 per item) and 12.38 at the junior secondary level (or 3.10 per item).

We are aware that the situation and conditions are not comparable, yet these striking differences give an impression of the level of divergent productivity. Low means were also obtained in composition writing. The analytic scoring system allows a scoring range from 1 to 25 (see Chapter IV). But the mean scores obtained at the SD and SMP level were only 6.35 and 8.90 respectively. Additionally, mean scores in originality of composition were .42 and .98 at the SD and SMP level, respectively, where the maximum possible score is 5.

Thus the situation exists that, altough creativity and intelligence are stronger related to school achievement than rote memory,which only means that the relatively more intelligent and the relatively more creative pupil perform better in school,yet the level of creative thinking tends to be low.

These findings are in the line of what has been stated in the Indonesian Educational Sector Surveys Report (1974), namely that 'children are usually not

encouraged to ask questions and there is little in the average classroom to encourage students to use their imagination, to raise problems of their own, to seek solutions to non-routine problems or to show much initiative', because these are exactly the activities required by the divergent thinking tasks.

Many authors came to conclude that creative growth has rarely been recognized as an educational objective. Taylor(1964) mentioned the results of a survey of social science teachers, reflecting the current status of high school objectives. When the teachers were asked to list the three most important objectives in a given course, and the listed objectives were then classified according to Guilford's five mental operations, the following results were obtained (p. 109) :

- cognitive	70.7 %
- memory	5.3 %
- divergent	1.7 %
- convergent	18.7 %
- evaluative	3.6 %

Specialists in many subjects consider that the curriculum has placed too much emphasis on answers laid down by tradition, and too little on teaching methods where divergent thinking is an important part. The teacher can seek opportunities to call for divergent thinking, e.g. by stimulating the students to raise questions and problems of their own, to look at a problem from different perspectives and to think of alternative solutions to a given problem.

The search for creativity also implies an evaluation and possibly a new role for the text-book . In most text-books learning consists of remembering and the funtion of the book is to supply the material to be remembered

We are agree with Stoddard (1959), that its main purpose should be introductory It should stir the student to ask, and find answers for key questions. It should send him to original readings, experiments and experiences. Livingstone (1944) pointed out that frequently in teaching we confuse means and ends.

We quote Livingstone (1944) on his matter :

> "Mathematics is not concerned with the ultimate end of life. Languages are not concerned with the supreme ends of life; nor are science, or geography, or economics..... I do not question the importance of these subjects, all are elements in the nourishment of the human being, but they are destitute, or almost destitute, of this essential vitamin..... I suggest then that the best way of bringing order into this chaos of the curriculum is for the teacher to have clearly in his mind this distinction of means and ends, and the need for higher ends, to feel that he is training his pupils to live a life that is a symphony and not a series of disconnected noises... to see that while they acquire the means which they need for the practical purposes of life, they should also form an idea of the end at which they should aim"(p.156)

3. THE IDEAL PUPIL AND THE CREATIVE PERSONALITY

The results of the study with the ideal Pupil Checklist, indicating that teachers and parents preferred behaviour characteristics in their children that hardly reflect the creative personality as defined by experts should also be a matter of concern.

It has been stressed by Treffinger et al(1968) that the effectiveness of schools in helping pupils to realize their creative potential hinges on the attitude of teachers toward creativity and its expression in their pupils.

4. THE CREATIVE ATTITUDE SCALE

Regarding creative attitude in children, the Creative Attitude Scale show substantial reliability coefficients at the SD as well as at the SMP

level, but the coefficients were higher at the SMP level.
The lower internal consistency and validity of the Creative Attitude Scale at the SD level can be attributed to differerces in developmental pattern between the two age groups (SD children may be less mature and less stable in attitude and concept formation as compared to SMP children), but it may also well be due to errors of measurement or inadequacy of this type of a scale for younger children.

In chapter IV it has been pointed out that 'creative attitude' involves a number of trait dimensions, operationalized in the different items of the scale. The factor analytic study (chapter V) indicates that most of these trait dimensions have been identified,but that an important part of the variance accounted for the different items is not covered by the six factors or traits, in other words, many of the items have a unique ideosyncratic meaning.

According to Guilford (1971), failure of tests in the creative area to correlate substantially with a criterion of creative performance can occur for a number of reasons, e.g an inappropriate criterion, a poor selection of abilities to be tested, and low reliabilities of criteria or of tests or of both.

Considering that in the present study the reliablities of the test instrument are sufficiently established (see Chapter V), the low correlations of the Creative Attitude Scale and other creative criteria would imply that obviously at the SD level creative attitude is less related to creative thinking abilities. It would probably be more appropriate to validate the scale against teacher ratings of non-aptitude traits related to creativity (e.g. pupil's independency in thinking and judgment, his non-conformism, his interests in creative activities, and the like) or against other

measures of non-aptitude traits of creativity, such as Barron's Independence of Judgement Scale, the Self-Assertiveness Scale of the California Psychological Inventory or other Personality Inventories. Such instruments probably produce higher correlations than cognitive measures of creative ability.

It is therefore desirable to conduct more research with the Creative Attitude Scale, before we are in a position to evaluate its worth and validity, particularly at the primary school level.
For example, several investigators have studied changes in attitudes as a primary component of effective creativity training. The validity of the Creative Attitude Scale could then be explored by administering it before and after a training program (as a pre- and post- test) designed to foster creative expression, such as had been done by Schaefer (1971) in the validation studies of his Creative Attitude Survey.
A significant gain in test scores before and after the training can be seen as an indication of the validity of the test.

Another approach that could be seriously considered is to evaluate the effects of different types of schools upon performance on measures of creative attitude as well as on measures of divergent thinking. We have in mind the Development Schools, which are still at the experimental stage and of which there are eight in Indonesia. The Development School is regarded as the project with the highest priority for through evaluation.

It is of crucial importance to find out whether the modular instructional system, adopted by the Development Schools, as contrasted to the traditional teaching learning strategy, would have any effect on a student's attitude and on the degree of divergency exhibited in his thinking.

The most striking difference between the Development School and the traditional school system lies in the degree of emphasis laid upon self-initiated learning. Would this innovative learning strategy which permits students to work at their own pace and to be responsible to some extent for evaluating their own work, affect his attitude in terms of more initiative, more self-confidence, more independence in thinking,more interest in creative activities and the like? Is the optimum development of divergent thinking abilities related to a certain teaching approach and to teachers attitude toward innovation?

Moreover, it would be very interesting to find out whether teachers from Development Schools differ in attitude from teachers using the traditional instructional system. After all, much depends on whether those teachers are capable and have the right attitude in disseminating the new program, whether parents and pupils will accept and adjust themselves readily to the drastic changes required by the new system.

5. PERSONAL AND ENVIRONMENTAL VARIABLES

The influence of socio-economic factors, sex, family size, ordinal position and parental attitudes as well as parents' educational level on the child's intellectual functioning have been also explored in the present study.

Previous studies in other cultures reported that boys show greater creativity than girls and that this is to a large part due to the different treatment boys and girls received (Hurlock, 1972). Such a 'discrimination' against girls was, however, not found in our study. The question whether this is typical for Indonesia, or only for urban areas or modern cities where boys and girls have the same opportunities,

cannot be decided and needs further exploration.

It also appeared that too much authority, supervision, and interference from parental side has no merit on the child's abilities, especially at the junior secondary level. Real interest from parents however, without domination, is related to higher achievement of children.

It should be noted that this section of the study has been primarily explorative and descriptive. Lack of adequate sample size and skewed distributions, prevented us from drawing any far reaching conclusions. Anyhow, analysis of the relationships between environmental variables and children's intellectual functioning, did give us an impression of how children's performance is affected by conditions of his environment. If we are aware what kinds of factors facilitate and what kinds of factors hinder creative performance, we will be more able in helping children to realize their potentialities.

6. SUGGESTIONS AND RECOMMENDATIONS

In the preceding discussion several problems have been mentioned for which further study will be desirable. We will finish this chapter with listing a number of other suggestions for future investigations and some recommendations for researchers as well as educators in Indonesia:

Research should be conducted to find out the effect of test instructions and speed conditions versus 'game-like', non-testing conditions on creative productivity. Some authors found that subjects generated more responses under instructions emphasizing quantity of production,

but that the increase in uncommon, high quality responses failed to keep pace with the total output.

Further research in the area of creativity should employ non-verbal as well as verbal tests of creativity in order to give a wider sampling of types of creative potentiality.

Research should be done to investigate the magnitude of relationships between creativity and intelligence as a function of the homogeneity versus heterogeneity of the groups studied.

Further studies should be done to find out to what extent creativity and intelligence in combination contribute to school achievement. Studies by Cline et al (1962) show that a combination of the two predict school achievement no more efficiently than either alone. In our study the contrary has been found.

Studies in originality should also involve originality in terms of remoteness of association and originality in terms of cleverness of response, and should relate these measures to measures of originality in statistical sense.

In creativity validation multiple predictors and multiple criteria procedures should be emphasized.

Research should be conducted at different age levels in order to detect developmental curves in creativity.

Longitudinal studies should be attempted, e.g. by following up children who have been distinguished for their creative products, or those who have been selected for scholarships.

Attention should be paid to conditions, approaches and attitudes that are conducive to the development of creative abilities, e.g. experiments to explore how to promote creative divergent thinking in the classroom, or to find out whether flexibility and originality can be taught, etc.

Studies on school environment as a determinant of creative growth are needed to explore the impact of school climate on students, e.g. investigation of the school atmosphere and behaviors of teachers which facilitate or hinder the development of creative potential in children.

Analyses of educational objectives and curricula should be done, in order to see what kinds of mental capacities and cognitive functions are primarily emphasized in the types of education under study. Curriculum chages should be sought that might favor the development of creativity and new ways in which the subject matter is presented should be tried out.

In-service training programs for teachers should be developed to further increase understanding and more favorable attitudes about creative characteristics, creative expression and creative problem solving abilities in children.

Chapter VII

S U M M A R Y

1. INTRODUCTION

'To give a fair chance to potential creativity is a matter of life and death for any society.' Although the problem of creativity is as old as man's history, the implications of Arnold Toynbee's words were recognized primarily after the Second World War. Some of the possible reasons for the delay of creativity research as compared to the rapid development of intelligence tests since the beginning of the 19th century are the following:

Until the end of the 19th century education was thought of as a privilege of the 'elite'. 'Society in general was little concerned about fostering or increasing its resources of men and women of outstanding ability' (Vernon, 1973, p. 10).
The prevalent idea at that time was that creativity is a matter of heredity and little can be done through education to affect it.

Creativity tests have not been favored, because of the rather complexity in scoring, which also allow for subjectivity.

The Stimulus-Response model in learning gave no access to the higher mental thought processes, including creative thinking.

Besides, creativity is a complex, multi-dimensional and not easily definable concept. It is even more difficult to establish proper criteria for creativity.

There is the deeprooted practice in schools to focus on achievement and intelligence tests alone in assessing a student's progress.

Two historical events have obviously led to the 'creativity movement':

- Guilford's presidential address to the American Psychological Association (1950) in which he emphasized the 'appallling neglect' of the study of creativity and called attention to the need for creativity in education.
- The advent of Sputnik in 1957 formed a threat to America and strongly stimulated educators in the search for and cultivation of creative potential.

Of primary importance in clarifying 'creativity' has been the distinction that Guilford made between the convergent thinking abilities and the divergent thinking abilities. 'Convergent thinking', or logical reasoning toward single right answers is the process that underlies the conventional intelligence tests, whereas 'divergent thinking', or thinking in different directions, producing a variety of ideas, is believed to be the most obvious indicator of creativity.

In proposing his Structure-of-Intellect model, Guilford (1956) proved that the conventional intelligence tests measure only a very small part of the whole repertoire of human intellectual abilities. The dimensions of intellect can be grouped in three categories: Operations, Contents, and Products. There are five kinds of operations: cognition, memory, divergent thinking, convergent hinking and evaluation. Content involves four categories: figural, symbolic, semantic and behavioral. The products involved may be units, classes, relations, systems, transformations, and implications. Guilford successfully redefined intelligence so as to include the divergent thinking abilities.

Based on factor analysis Guilford (1959) identified the following traits of creativity: word fluency, associational fluency, expressional fluency, ideational fluency, spontaneous flexibility, adaptive flexibility, originality and elaboration.

He arbitrarily defined creative thinking as divergent thinking, but emphasized that divergent thinking does not account for all the intellectual components of creative productivity. 'Redefinition', another trait of creativity has been placed in the category of convergent thinking, and 'sensitivity to problems' in the category of evaluation. Even memory abilities make their contributions toward creative performance.

His studies also involve non-aptitude traits of creativity. Some of these, e.g. need for adventure, tolerance of ambiguity, impulsiveness, self-confidence, appreciation of creativity and of esthetic expression, reflective thinking, and a strong need for variety, have been found to correlate statistically significantly with tests of fluency, flexibility and originality, although all correlations were below .30.

One of the crucial problems in creativity research has been the criterion problem. In general authors agree that it is difficult to obtain reliable and valid criteria. Yamamoto (1964c) stressed that it is almost impossible to find a criterion which is not contaminated by other features of human traits and behavior, especially by intelligence. Because creativity is a multi-dimensional construct and

any criterion is also factorially complex, one cannot easily expect substantial relathinships between the two (Guilford, 1971). A multi-dimensional (MacPherson, 1963) and multi-criterion (Yamamoto, 1964c) approach seem to be the best way to attack the problem, to weave a nomological net to support the creativity construct.

Yamamoto (1964a) pointed out that much of the conflicting results in creativity research can be attributed to: different points of departure in the definition of creativity, differences in assumptions, and differences in research strategies.

2. INDONESIAN EDUCATIONAL SYSTEM

The formal school system in Indonesia consists of six years primary education, three years junior secondary education (SLTP), and three years senior secondary education (SLTA). There are schools of vocational education at the junior secondary and senior secondary levels. Graduates of senior secondary schools have access to academic institutions and universities, if they pass the necessary entrance examinations.

As some of the big challenges faced by Indonesia today in the field of education were mentioned: About half of the population consists of young people (under 15 years of age). The sharp increase of pupil enrolment since Indonesia's Independence cannot be balanced with a proportianally increase of educational facilities. The illiteracy rate is still high (40%) as is the drop out rate (63%, 20%, and 70% at the primary, junior and senior secondary levels respectively).

Another crucial problem is the low standard of education. In primary as well as in junior secondary schools the emphasis is on routine skills and on rote memorization. 'Children are not encouraged to ask questions, to use their imagination, to raise problems of their own, to seek solutions to non-routine problems' (Indonesia Education Sector Survey Report, 1974).

Educational objectives bear little relevance to societal need. Schools seem to be more interested in preparing pupils to pass an exam, rather than trying out new teaching methods (BP3K, 1976a). There is also a lack of adequately trained teachers, and many teachers are not satisfied with their jobs.

However, recent developments in education indicate efforts by the government to improve the situation (a.o. new textbooks, curriculum and teacher training improvement, better salaries for teachers).

Starting with the Second Five Year Plan (1974), the increase of Government revenues opened wider perspectives for the educational sector especially for primary and secondary education (Setijadi, 1975).

One of the new projects, the Development Schools, has high priority. This innovation system made use of the modular instructional system, which allows the student to work independently at his own pace, the teachers functioning not primarily as disseminators of information, as in the traditional school system, but as the organizer and supervisor of learning activities (Soedijarto, 1976a).

It is expected that by the end of the Second Five Year Plan, the curriculum now being tried out at the Development schools, and which is assumed to bear relevance to societal needs, can be disseminated

throughout Indonesia.

Another promising project is the program to develop talent and achievements, providing scholarships for bright students who lack the facilities to continue education. In this respect the problems faced by the educational sector are: to construct appropriate selection tests, to establish relevant criteria in selecting those who are most in need of financial aid, and to follow up the scholarship holders to evaluate appropriateness and effectiveness of both criteria and instruments of selection. Considered are the use of achievement as well as of psychological tests (Departement of Education and Culture, 1975-1976).

Arguments pro and contra the use of achievement versus psychological tests have been discussed (Drenth, 1977a). Both have their advantages as well as limitations, therefore both should be used whenever possible. In any case, the use of achievement tests require an empirical demonstration of the relationships between achievements in the previous school and the learning process in the next. Likewise, aptitude test should show substantial correlations with relevant criteria for future school performance. The use of achievement tests is recommended for selection and admission purposes in order to set minimum standards of acceptance. But if the number of acceptable students exceeds the number that can possibly be admitted (as is mostly the case in Indonesia), selection should also be based on aptitude or ability test.

3. RATIONALE AND OBJECTIVES OF THE PRESENT STUDY

The following considerations have led to the design of the present study:

1. In the first place there is the need for instruments to assess creative thinking processes. Until now measures of intellectual abilities have been confined to the traditional intelligence tests, which focus on convergent thinking. We lack instruments that may serve the nation's need for identifying creative potential.
2. After more than twenty years of intensive research the dimensionality question still has not been satisfactory answered, namely whether measures of divergent thinking ('creativity') show a substantially greater degree of internal consistency, than the degree to which they correlate with measures of convergent thinking ('intelligence').
3. Another important problem in view of its educational implications concerns the question as to what degree creativity and intelligence contribute to school performance, with other words, their effectiveness as predictors. Related to this question is the validity of the 'IQ threshold concept': is there a threshold of intelligence, a cut-off point above which creativity is no longer related to intelligence?

   The educational implication is that especially with small selection ratios a high proportion of students with creative potential will be left out, if identification of talent or if selection is mainly based on conventional IQ tests. In most developing countries,

including Indonesia, the need for education is much greater than the actual possibilities for placement. With very small selection ratios only the very high-intelligents will be accepted, and considering that at the high IQ levels the correlation with creativity is low, consequently an important part of the high-creatives will be excluded.

Hofstee's (1969) 'inverted diagnostics' shows another way of looking at the relationships between various measures of cognitive functioning and success in school, namely to use them as reference points in diagnosing the school system - its objectives and its output (for a practical example in Indonesia, see Drenth, 1977b).

4. Many authors (a.o. Guilford, 1959; Roe, 1952; Barron, 1955; MacKinnon, 1962; Taylor & Ellison, 1964; Cattell & Butcher, 1968) recognized that non-aptitude traits, such as interests, attitudes, motivation, temperament etc. play an important role in creative productivity.

Numerous studies have been conducted involving persons who have been identified as outstandingly creative, or having as objective the construction of techniques (Rating Scales, Biographical and Personality Inventories, Attitude Scales) to distinguish creative persons from non-creative persons. All these studies report a cluster of related traits, characteristic of the creative personality (the 'creativity syndrome'). The fact that creativity is a multi-dimensional construct, in which aptitude as well as non-aptitude traits are involved, requires that the problem has to be attacked fron different perspectives.

5. To give an optimal chance to a child's potentialities, it is not only important to provide him with the proper education, but also the attitudes of those with whom he is mostly in contact, his parents and teachers, are very crucial. If we want to develop creative potential of our schoolchildren, we must somehow learn to reward creative performance. Yet, studies conducted in several cultures (Torrance, 1965; Bachtold, 1974) indicate that the characteristics teachers and parents favor in children, bear very little resemblance to the behavior characteristics of creative persons. The study of Getzels & Jackson (1962) give cause for concern in that teachers seem to prefer the high IQ students in class above the high creative students, although both groups do not differ in school performance.

   It is highly important to find out whether educators' attitudes in Indonesia are conducive in nourishing creative behavior in children.

The basic assumptions underlying the present study were the following:

a. The focus is on creative thinking processes.
b. Creativity is conceptualized as a continuum.
c. Creativity is a multi-dimensional construct.
d. Creativity is the resultant of a process of continuous interaction between an individual and his environment.
e. Creative thinking ability is a process that manifests itself in fluency, flexibility and originality of thinking.

The general purpose of this study was to draw attention to the problem of creativity: the need to identify creative potential and to develop creative thinking processes in children.

Its main objective was the development of a battery of creative thinking abilities and to investigate their relationships with:

- other dimensions of cognitive functioning: convergent thinking and short-term memory (discriminant validity)
- a number of criteria of creativity: teacher nominations and composition writing (confirmant validity)
- non-aptitude traits of creativity: for this purpose a Creative Attitude Scale had been developed
- school performance: to asses the predictive power of measures of creative thinking as compared to measures of intelligence and of rote memory
- a number of personal and environmental variables.

Its conceptual framework was Guilford's Structure-of-Intellect model.

Significance of the study:

1. The identification of a battery of divergent thinking ('creativity') measures might open wider perspectives of assessment of intellectual abilities.
2. The instruments developed in this study (the Creativity Battery, the Creative Attitude Scale, and the Scoring Scheme to evaluate creative writing ability) might serve the need to identify creative pontential. They can be used for selection and admission purposes,

as well as in individual diagnostic pracitce.

3. The relationships between measures of creativity, intelligence and rote memory to school performance not only create possibilities to estimate the predictive power of these measures with regard to success in school, but also provide information about the educational system, its objectives and outcomes.
4. Furthermore, this study also illustrates the relationships between environmental variables and cognitive variables, and the extent to which teachers' and parents' attitudes are conducive to the development of creativity in children.
5. Finally, this type of study serves a theoretical goal, in that it deals with basic questions in the area of creativity.

4. DESIGN OF THE STUDY

The Creativity Battery consists of six subtests, three measures of word fluency and three measures of ideational fluency. In terms of Guilford's SI-model, they share the same operation (divergent) and content (semantic) category, but they differ in product category. Tasks have been chosen that sample different kinds of manifestations of creative thinking ability. Care has been taken in devising administering and scoring procedures that are simple and economical, and where objectivity in scoring is sufficiently guaranteed. Time limits were set that were broad enough to allow the children sample opportunity to express their ideas.

The following subtests constitute the Creativity Battery: Word Beginnings, Anagram, Three-Word-Sentences, Thing Categories,

Unusual Uses and Consequences.

The first three tests are similar in that they require the subject to produce words, while the last three tests require the ability to generate ideas, therefore we classify them as 'ideational fluency'. Word Beginnings and Anagram are measures of word fluency, but in Anagram a process of breaking down and restructuring of the letters of the stimulus word is involved, and in Three-Word-Sentences, a measure of expressional fluency, a process of organization of the verbal material. Thing-Categories is a measure of ideational fluency. Unusual Uses provides two measures, flexibility and originality. Consequences provides a measure of ideational fluency combined with elaboration.

The Creative Attitude Scale has been developed to provide a non-aptitude measure of creativity. Item construction was based upon a review of the literature with respect to the characteristic attitudes, beliefs and values of persons who were identified as being creative. Creative attitude has been operationalized in the following traits: Openness to novel and unusual experiences, flexibility of thinking, freedom of expression, appreciation of fantasy, interest in creative activities, confidence in own ideas and independence of judgment.

Torrance' Ideal Pupil Checklist has been adapted for use in the present study to give an impression to what extent teachers and parents perception of the ideal pupil reflect behavior characteristics of the creative personality. The underlying assumption is that those behaviors will be encouraged by parents and teachers that they regard as ideal.

Consequently, if behavior characteristics considered ideal by teachers and parents resemble characteristics of a creative person, creativity will be encouraged in children.

To provide a criterion measure for the divergent thinking tests, an analytic scoring scheme has been developed, to assess creative writing ability in composition writing. The scoring scheme includes four criteria of creativity: fluency, flexibility, originality and elaboration or richness, Each of these four criteria comprises five components. Hence the maximum score is 20.

Teacher nominations about a pupil's creativity formed another criterion variable. Some reference points were given to be considered in identifying creative pupils. At the SD level the rating is done by the classroom teacher, at the SMP level by those teaching the following subjects: Bahasa Indonesia, Mathematics, Science, Social Science and English. These five subjects were included in the School Achievement Test developed by the Office of Educational and Cultural Research and Development (BP3K) for use in the national assessment of the quality of education in 1975 and 1976, and which we also used in the present study to assess scholastic success.

In constituting a nomological network to clarify the divergent thinking construct, two testvariables were selected from the convergent thinking category ('intelligence') and two other test variables from the memory operation category. The discriminant validity of the divergent thinking tests has been tested with these cognitive variables as criteria.

Two age levels were chosen to determine the effect of age differences on the test variables (Analysis of Variance). We chose sixth graders and ninth graders, being the students who are about to take their final examinations, thus allowing us to infer what effects educational systems have on the development of aptitudes and attitudes. The sample consisted of 129 sixth graders (SD) and 138 ninth graders (SMP) from public schools in Jakarta.

To explore the effects of environmental conditions on creative thinking ability, a number of items from a questionnaire developed by the Office of Educational and Cultural Research and Development for the National Assessment Survey in 1975 were related to the testvariables.

A Pilot Study has been conducted involving the Creativity Battery and the Creative Attitude Scale to select the items for the definite test-battery (based on their discriminative power).
Concerning the Creativity Battery, far more items turned out to be useful than was necessary for the definite battery; it was decided to retain four items within each subtest, so that eventually the test could be split into two parallel forms, each subtest containing two items. The definite Creative Attitude Scale consisted of 32 items.

Based on Guilford's SI-model as theoretical framework and considering the research findings from relevant literature, twenty six hypotheses were formulated:
Five hypotheses concerned the discriminant validity of the Creativity

Battery, four hypotheses concerned the predictability of school performance from measures of divergent thinking, convergent thinking and rote memory, three hypotheses concerned the validity of the Creativity Battery with external criteria, four hypotheses concerned the validity of the Creative Attitude Scale, five hypotheses concerned the difference in performance of sixth graders and ninth graders, and five hypotheses concerned the 'ideal pupil' perception by teachers and parents.

The data analysis was primarily based on the correlational method and analysis of variance.

To analyse differences between sample means (Analysis of variance), the t-test and the F-test were used.

To indicate the magnitude of relationships between two variables independent of the influence of another variable, partial correlation coefficients were computed. To estimate the maximum possible correlation between a criterion variable and the weighted sum of two predictor variables, multiple correlation coefficients have been calculated. Factor-analysis has been conducted on the basis of an intercorrelation matrix of a set of testvariables, to find out whether the hypothesized constructs could be revealed (identified), and further confirmant validity could be obtained.

5. RESULTS OF THE STUDY

5.1. Reliability studies

Objectivity and reliability of the different measures havebeen extensively checked.

Concerning the Creativity Battery, objectivity in scoring has

been guaranteed by the very high interscorer reliability coefficients for the three ideational fluency tests ranging from .94 to .99. The test-retest reliabilities of the six divergent thinking test, ranging from .65 to .75 at the SD level and from .68 to .86 at the SMP level, indicated reasonable stability. The split-half reliabilities corrected for the total test, were .95 at both the SD and SMP level; these magnitudes are very high, the more where Schoppe (1975) maintained that the split-half method is ineffective with creativity tests. Even uncorrected, the half-test reliabilities are still of a high order (.90 at both school levels, based on the total score), meaning that the tests can be split into two alternative forms.

The reliability coefficients of the Creative Attitude Scale, based on the split-half method, the Kuder-Richardson 21 formula, and the test-retest method show substantial magnitudes, and are in general higher at the SMP level than at the SD level. The rather low test-retest reliability at the SD level (.37, while .68 at the SMP level), suggest, either the possibility that the Creative Attitude Scale is less reliable when used at the primary level, or that attitude formation has not been sufficiently developed or stabilized at the SD level.
Most of the hypothesized traits of creative attitude could be identified by factor analysis, but the factorial study also revealed that an important part of the variance is not covered by the six identified factors, and that many individual items have partly their own unique meaning, also. We should emphasize however, that this does not necessarily reduce the usability of the scale, because the scale has been intended to be used as one total scale and not as a series of subscales.

Interrater agreement in composition scoring was high, based on the analytic as well as on the global rating method (ranging from .67 to .99), but with the analytic method the reliabilities were somewhat higher. These results confirm those of studies abroad (Wesdorp, 1969).

5.2. Discriminant validity of the Creativity Battery

Conform to expectations, the divergent thinking measures showed a substantially greater degree of interrelatedness (.54 and .51 at the SD and SMP level respectively) than the degree to which they correlated with measures of convergent thinking (.36 and .33 respectively at the SD and SMP level) and short-term memory (.20 and .21 at the SD and SMP level respectively). The relatively low correlations with the convergent thinking measures could partially be attributed to the low correlations with Figure Exclusion (figural convergent). However, data with the Circle-Test (figural divergent) demonstrated that the substantial relationships between the divergent thinking measures and Word Relations is not simply a question of the common verbal factor, because the Circle Test also correlated higher with Word Relations than it did with Figure Exclusion. Studies abroad have found the capacity of thinking by analogy an essential, fundamental element of creative thinking (Ribot 1906, in Torrance 1965).

The results of factor analysis justified the identification of the divergent thinking variables as a relatively unified dimension, despite the differences in type of task of the individual subtests. However, it also ascertains the existence of underlying multidimensionality. The word fluency variables showed second loadings on the

factor that has been identified as 'intelligence'. At the junior secondary level, Three-Word-Sentences, Thing Categories and Consequences showed also high loadings on the factor identified as 'general verbal aptitude'. At the primary level however, the ideational fluency measures emerge as an uni-dimensional cluster, showing the highest loadings on the factor identified as 'creative thinking ability'.

A distinction can be made between the word fluency measures and the ideational fluency measures, the first showing a substantial degree of common variance with the convergent thinking measures and with school acievement, while the latter seemed to define the kind of thinking, that is most independent from the traditional concept of intelligence. The latter also showed somewhat stronger intercorrelations with the criterion variables (composition writing and teacher ratings). These findings were in accordance with Wallach's (1970) conclusions, that the ideational fluency tests seem to be the better predictors of creative performance.

Summarizing, with regard to the dimensionality question, the results of the correlational and the factor analytic studies indicate that the divergent thinking measures are substantially cohesive as a relatively unified dimension, but they also show significant relationships with the convergent thinking measures. This is in line with the conception of creativity as a multi-dimensional construct.

Any creative problem solving activity involves in the first place the process of generating many ideas (divergent thinking), to be followed by the stage of a critical selection of the most appropriate

alternative or solution (convergent thinking) and finally by the stage of evaluating the result.

5.3. Confirmant validity of the Creativity Battery

The validition of the Creativity Battery with respect to the criterion variables yielded satisfactory results. With composition writing, based on the analytic scoring method, the validity coefficients were .35 and .31 at the SD respectively SMP level; with the global rating method .43 and .37 at the SD and SMP level respectively, all significant beyond the .01 level. With teacher nomination - a criterion measure of creativity, often disputed because of its questionable validity, although they did well as predictors of school performance- based on the total creativity test score the validity coefficients were .38 and .36 for the SD and SMP level respectively (significant beyond the .01 level). When teacher ratings were correlated with the seven measures of divergent thinking, 45 of the 48 validity coefficients, involving both levels of schooling, were significant at the .05 level or better. The average interrater agreement among 15 SMP teachers was .41. While these magnitudes are not very high, they are still remarkable, considering the complexity of both the creativity construct and the creativity criteria.

5.4. Prediction of School Performance

The correlational pattern of the cognitive test variables (convergent thinking, divergent thinking and rote memory) toward school performance revealed and interesting picture. The divergent

thinking measures ('creativity') proved to be equally valid (.68 and .63 at the SD and SMP level respectively) as the convergent thinking measures ('intelligence' , .72 and .58 at the SD and SMP level respectively) in predicting school achievement. And both were superior in predictive power as compared to measures of rote memory. In fact, this had not been expected, considering the results of the Education Survey Report (1974) which stated that 'schools emphasize rote memorization'.

Moreover, if the variable 'intelligence' is kept constant, in order to find out the exclusive contribution of creativity to school performance, the relationship is still very substantial (.45 and .44 at the SD and SMP level respectively). Reversely, intelligence appear to be independently associated with school achievement. Not less important was the finding that the combination of intelligence and creativity increased the efficacy of prediction of school achievement than either alone (.78 and .68 at the SD and SMP level respectively). The educational implication is that both measures can be used separately for practical purposes of predicting school performance and for the identification of talent, but that the combination of both will do better.

However, it should be noted that the correlational pattern is not saying anything about the absolute level of performance. While measures of creative thinking appear to correlate substantially with school acievement, there are indications that in general the level of divergent thinking tend to be low, as indicated by the low means in fluency, flexibility and originality of thinking. This also applies for scores in composition writing. Apparently, thinking in different directions,

looking at a problem from different perspectives, using imagination and coming up with original ideas are less developed in the present school system. To our opinion this should be a cause for serious concern, especially where the Indonesian Educational Sector Survey Report (1974) came to the same conclusion.

Furthermore, this study is probably a-typical for Indonesia; it is limited to a small number of public schools in a metropolitan city as Jakarta. The correlational pattern we found could be quite different, if schools were to studied located in remote rural areas, isolated from educational facilities and experiences.

5.5. The threshold of intelligence.

The interesting concept of threshold of intelligence, supported by the studies from Getzels and Jacson (1962), Torrance (1962a), Yamamoto (1964a) and others, that above a certain level of intelligence there is little relationship between IQ and creativity, was not unanimously supported in the present study. At the SD level the correlation between scores of the 20% highest in intelligence tests and the corresponding creativity scores was as high as .64, while at the SMP level it was almost negligible (.12). The latter seems strongly to support the IQ threshold theory, however, the very restricted range in scores in intelligence could account for the low relationship with creativity scores. It would require further studies to explore on this matter.

On the whole, we can say that in the present study the reliability and the construct validity of the Creativity Battery as well as its

predictive power with respect to school achievement, is satisfactorily high.

5.6. The Creative Attitude Scale

With respect to the validation of the Creative Attitude Scale we had more difficulties. We still doubt whether we have chosen the appripriate criterion measures. Other attitude scales or teacher nomination involving non aptitude traits of creativity might have been more relevant. The heterogeneity of the creative attitude construct (as demonstrated by factor analysis) add to the complexity and difficulty in validating the scale.

Anyhow, at the SMP level creative attitude proved to be subtantially related to the divergent thinking measures (r=.42), to composition writing based on the analytic (r=.30) as well as on the global rating method (r=.26). Correlations with teacher nominations were also significant beyond the .05 level, with the exception of the rating of English teachers.

At the SD level scores on the Creative Attitude Scale correlate significantly with teacher ratings, but not with composition writing or with the divergent thinking measures. This could be due to the earlier discussed low reliability of the scale at the SD level, and it could also mean that at this level creative attitude is less related to creative thinking ability than at the SMP level.

5.7. Analysis of Variance

Speaking about the two levels of schooling, there are significant differences in performance between sixth graders (SD) and ninth graders (SMP) on all testvariables, except Remembering Numbers and Composition-Sentence structure. When based on the sumscore, the difference is not significant only for rote memory. This would imply that the development

of rote memory is less dependent on both age and schooling,es compared to convergent thinking, divergent thinking and creative writing ability.

5.8. Teachers' and parents' perception of the ideal pupil

Studies have indicated that the extent to which a child's creative potential will be nurtured, is a function of teachers and parents attitude toward creativity. In the present study it has been found that teachers and parents highly agree (r = .96) on what they prefer in children. Likewise, among psychologists there is high agreement (rho = .94) on their conceptions of the creative personality. But the behavior characteristics that teachers and parents prefer in children have hardly relation with those characteristics for creativity. These data are suggesting that those bearing responsibility for the education of children and young people should realize that their values and appreciations are not very conducive to the development of creative potentiality.

5.9. Personal and environmental variables

Inspection of the relationships between the test variables (creativity intelligence, memory, school-achievement and compesition writing) and some personal and environmental variables yield interesting results.

In the first place it has been found that sex was not a discriminating factor: boys and girls perform equally well on all of the test variables. Whether this picture is typical for other areas outside Jakarta, need to be further explored. Anyhow, the BP3K nationwide survey in 1975 and 1976 found no significant differences in school achievement between boys and girls.

Age seems to be conversely related to test performance: the younger the child in a given class, the higher his achievement.

As to size of family, in the SD group the only children seem to be in an adventageous position with regard to performance level. But in general no significant differences in performance of children from small-size and children from large-size families were found, at the SD as well as at the SMP level.

The superiority in achievement of those who take private lessons has not been proved.

The general trend is that the higher the educational level of the parents the better the achievement of the children. There are indications that the mother's educational level are stronger positively related to a child's performance than that of the father.

The kind of language spoken at home - whether Bahasa Indonesia, local or mixed language - obviously bear no relevance to the child's performance level.

Indonesian children, as indicated by the questionnaire, seems to be very industrious: 66% spent more than one hour every day in doing homework. In general the amount of time spent in doing homework appears not to be significantly related to level of achievement.

A private place to study appears not essential for better achievement.

Whereas for primary school children parental supervision on homework resulted in higher achievement, at the junior secondary level, children seem not to require parental supervision to achieve.

The extent to which a family is able to provide certain facilities for the children (such as newspaper subscription, television and books at home) are positively related to achievement levels.

With regard to leisure time activities, reading, talking and playing seem to have more positive effects on creativity scores than listening to the radio, watching television and helping parents.

Concerning parental attitudes in education, the data suggest, that interest is a positive determinant of children's creative performance, but that an authoritarian approach has a reversible effect on his achievement. To much interference from parental side e.g. on a child's speech, his reading interest, on imposing rules at home, does not produce higher levels in creativity test performance.

These results in general confirm the theories, in which creativity is conceptualized as the opposite of authoritarianism (Gowan, 1967b), that creativity is a manifestation of the full functioning, self-actualizing individual (Maslow, 1959), and that creativity is fostered in a non-authoritarian climete, which permit the individual freedom of thinking and of expression, and where the source of evaluative judgment is internal (Rogers, 1973).

6. CLOSING REMARKS

In the last chapter several questions left open for further studies have been pointed out, and some recommendations have been made.

Of the twenty six hypotheses put to test, twenty one have been accepted, namely the four hypotheses concerning the relationships between the divergent thinking, the convergent thinking and the short-

term memory measures; the four hypotheses concerning the relationships of creativity, intelligence and memory with school performance; the three hypotheses concerning the relationships between measures of creative thinking and external criteria, five hypotheses concerning the performance of primary and junior secondary students, and five hypotheses concerning the perception of the ideal pupil by teachers and parents. The four hypotheses concerning the Creative Attitude Scale have been confirmed only at the SMP level; the hypotesis that there will be significant differences in short-term memory between the SD and the SMP sample had to be rejected.

We found the present study satisfying, not only since the newly developed instruments in general turned out to be sufficiently reliable and valid, but also because it has thrown some light on the educational system as is exists in Indonesia.

The Creative Attitude Scale can be used at the junior secondary level. Further research is needed to establish its validity, particularly at the primary level.

The Creativity Battery is ready for use with children from primary and junior secondary schools. Tentative norm data have been established. It could even be used with students and with adults (try outs are under way), providing that norm data are collected. Two shorter parallel forms for each subtest are available.

The Creativeity Battery can be utilized for selection and admission purposes, as well as for individual diagnostic practice.
It also can be used in further research on creativity and in studies

in which the relationship between creativity and educational objectives and present practices is investigated.

It should be recognized that if creativity is to be enhanced by the educational system, more attention should be paid to this type of thinking in defining instructional objectives.

It is our hope that the present study may function as a stimulant for many other studies in this interesting and challenging field.

RINGKASAN

1. PENGANTAR.

Sepanjang sejarah umat manusia kreativitas merupakan masalah yang selalu menarik perhatian, namun baru sesudah Perang Dunia kedua masalah tersebut menjadi pokok pembahasan penelitian ilmiah dan empiris.

Sebagai kemungkinan sebab dari kelambanan riset dalam bidang kreativitas jika dibandingkan dengan perkembangan yang cepat dari test inteligensi sejak permulaan abad ke-19 dapat dikemukakan a.l.:

Sampai akhir abad ke-19 pendidikan masih dianggap sebagai 'privilege' dari golongan 'elite'. Masyarakat waktu itu kurang memperhatikan pengembangan bakat pada umumnya, apalagi dari segelintir orang yang mempunyai kemampuan yang menonjol. Anggapan yang lazim pada waktu itu adalah bahwa kreativitas merupakan bakat pembawaan, anugerah dari Tuhan yang dimiliki atau tidak dimiliki dan tak banyak yang dapat dilakukan melalui pendidikan untuk mempengaruhinya.

Test 'kreativitas' juga kurang dikembangkan, karena cara penilaian dan sistem pemberian skor yang agak kompleks, disamping itu ada kemungkinan subyektivitas dalam pemberian skor.

Kecuali itu model "Stimulus-Response' dalam belajar kurang melibatkan proses proses mental yang tinggi, termasuk kreativitas.

Ditambah lagi kreativitas merupakan konsep yang majemuk, multidimensional dan tidak mudah dirumuskan. Lebih sulit lagi untuk menemukan kriteria yang tepat bagi kreativitas.

Di sekolah sekolah masih berlaku kebiasaan yang sudah berakar untuk hanya menggunakan test prestasi belajar dan test inteligensi untuk mengukur kecakapan dan kemajuan murid.

Dua peristiwa bersejarah nyata mempengaruhi melonjaknya perhatian terhadap bidang kreativitas, yaitu:

- Pidato dari Guilford (1950) sebagai president dari American Psychological Association, dimana ia menekankan 'the appalling neglect' dari studi kreativitas dan ia menunjuk pada kebutuhan akan kreativitas di masyarakat pada umumnya dan pentingnya kreativitas dikembangkan melalui pendidikan.
- Peluncuran Sputnik pada tahun 1957 dirasakan sebagai ancaman bagi Amerika untuk mempertahankan keunggulannya di bidang teknologi yang mendorong dunia pendidikan untuk menemukan dan memupuk bakat kreatif.

Meningkatnya perhatian terhadap perbedaan individuil disamping demokratisasi dari pendidikan ikut mempengaruhi perubahan konsep kreativitas sebagai suatu kontinuitas, yang dimiliki setiap orang dalam derajat yang berbeda-beda.

Yang sangat berperan dalam menjelaskan konsep kreativitas adalah usul Guilford untuk membedakan antara 'kemampuan berfikir konvergen' dan 'kemampuan berfikir divergen'. 'Pemikiran konvergen' atau penalaran logis menuju satu jawaban yang benar, merupakan proses yang mendasari test inteligensi yang tradisionil, sedangkan 'pemikiran divergen' atau corak pemikiran yang menghasilkan bermacam-macam gagasan, menurut Guilford merupakan indikator yang paling nyata dari kreativitas.

Dalam modelnya tentang struktur intelek (Structure-of-Intellect model) Guilford (1956) secara teoretis membedakan 120 faktor intelek manusia dan ia menegaskan bahwa test inteligensi yang konvensionil hanya mengukur sebagian kecil dari keseluruhan reportoire kemampuan intelek manusia.

Kemampuan intelek dapat dikelompokkan menjadi tiga dimensi, yaitu operasi, kontent dan produk. Operasi meliputi lima kategori: kognisi, daya ingatan, pemikiran divergen, pemikiran konvergen dan evaluasi. Kontent meliputi empat kategori: figural, simbolis, semantis (verbal) dan behavioral. Produk meliputi: kesatuan, kelas, relasi, sistem, transformasi dan implikasi.

Berdasarkan faktor analisa Guilford (1959) berhasil mengidentifikasikan 'traits' dari kreativitas yang termasuk kategori pemikiran divergen sbb.: 'word fluency, associational fluency, expressional fluency, ideational fluency, spontaneous flexibility, adeptive flexibility, originality dan elaboration'. Secara operasionil ia merumuskan pemikiran kreatif sebagai pemikiran divergen, tetapi ia menegaskan bahwa pemikiran divergen tidak meliputi semua komponen intelek dari produktivitas kreatif.

Penelitiannya juga meliputi 'non-aptitude traits' dari kreativitas, a.l. Kebutuhan akan petualangan, toleransi terhadap kedwiartian (ambiguity), impulsivitas, kepercayaan diri, apresiasi terhadap kreativitas dan terhadap ekspresi estetis, pemikiran reflektif, dan kebutuhan yang kuat akan variasi. Ciri ciri ini menunjukkan korelasi yang statistis signifikan dengan test 'fluency', 'flexibility' dan 'originality'.

Salah satu masalah yang kritis dalam bidang penelitian kreativitas adalah so'al kriteria. Pada umumnya para ahli sependapat bahwa sukar sekali untuk mendapatkan kriteria yang tepat. Yamamoto (1964c) menekankan bahwa tidak mungkin untuk menemukan kriterium yang tidak tercampur dengan ciri ciri dan perilaku manusia lainnya, terutama inteligensi. Karena kreativitas merupakan konstruk yang multi-dimensional dan begitu

pula setiap kriterium, maka sulit untuk mendapatkan hubungan yang substansiil antara keduanya (Guilford, 1971).

Suatu 'multi-dimensional' (MacPherson, 1963) dan 'multi-criterion approach' (Yamamoto, 1964c) kiranya merupakan cara yang terbaik untuk menghadapi masalah tersebut, yaitu dengan penyusunan jaringan nomologis sekitar konstruk kreativitas. Menurut Yamamoto hasil-hasil yang saling bertentangan dalam bidang penelitian kreativitas dapat dikembalikan pada titik tolak yang berbeda dalam perumusan kreativitas, perbedaan dalam asumsi dan perbedaan dalam strategi riset.

2. SISTEM PENDIDIKAN DI INDONESIA

Sistem sekolah yang resmi di Indonesia terdiri dari enam tahun pendidikan dasar (SD), tiga tahun pendidikan lanjutan pertama (SLTP) dan tiga tahun pendidikan lanjutan atas (SLTA). Pada tingkat lanjutan pertama dan atas ada bermacam-macam sekolah kejuruan. Lulusan dari sekolah lanjutan atas dapat masuk perguruan tinggi.

Dewasa ini Indonesia menghadapi banyak tantangan dalam bidang pendidikan, a.l. pemerataan, mutu dan relevansi pendidikan.

Peningkatan yang tajam dari jumlah murid sejak kemerdekaan Indonesia tak dapat diimbangi oleh peningkatan fasilitas pendidikan yang proporsionil.

Kurang lebih separoh dari penduduk termasuk golongan usia yang belum produktif (0 - 14 tahun).

Persentase yang buta huruf masih tinggi (40%), begitu pula yang putus sekolah (63%, 20% dan 70% pada tingkat SD, SLTP dan SLTA).

Di sekolah -SD maupun SLTP- pengajaran ditekankan pada tugas tugas rutin dan hafalan semata-mata. Menurut Laporan Survey Sektor Pendi-

dikan di Indonesia (1974), 'anak anak tidak dirangsang untuk mengajukan pertanyaan, menggunakan daya imajinasinya, mengemukakan masalah sendiri atau mencari penyelesaian terhadap masalah non-rutin'. Tujuan pendidikan dirasakan kurang relevan dengan kebutuhan masyarakat. Sekolah hanya mempersiapkan anak untuk lulus ujian untuk dapat mengikuti pendidikan yang lebih tinggi; kurang ada usaha untuk mencobakan metode pengajaran yang inovatif (BP3K, 1976a). Pendidikan guru belum dapat memenuhi tuntutan jabatannya dan banyak guru yang tidak merasa puas.

Namun perkembangan terakhir menunjukkan usaha dari pemerintah untuk menanggulangi situasi ini (a.l. perbaikan kurikulum dan pendidikan guru, gaji yang lebih tinggi bagi guru, buku teks yang baru).

Sejak Repelita II (1974), peningkatan dari pendapatan pemerintah membuka perspektif yang lebih luas untuk sektor pendidikan, terutama untuk pendidikan dasar dan menengah (Setijadi, 1975).

Salah satu dari proyek baru yang mempunyai prioritas yang tinggi adalah Sekolah Pembangunan. Sistem inovatif ini menggunakan sistem pengajaran modul yang memungkinkan murid untuk bekerja menurut temponya sendiri; fungsi utama dari guru tidak sebagai pemberi informasi, sebagaimana halnya pada sistem sekolah yang tradisionil, akan tetapi sebagai organisator dan supervisor dari kegiatan belajar (Soedijarto, 1976a). Diharapkan bahwa pada akhir Repelita II, kurikulum yang sekarang sedang di implementasikan di Sekolah Pembangunan dan yang diasumsikan relevan dengan kebutuhan masyarakat, dapat disebarkan di seluruh Indonesia.

Proyek baru lainnya menyangkut program pengembangan bakat dan prestasi, yang menyediakan beasiswa untuk pelajar pelajar yang ber-

bekat dan yang tidak mempunyai fasilitas untuk melanjutkan pendidikan. Dalam hal ini masalah yang dihadapi oleh sektor pendidikan ialah konstruksi dari pada alat alat seleksi yang tepat, menentukan kriteria yang relevan dalam seleksi mereka yang membutuhkan bantuan finansiil dan efektivitas dari alat seleksi maupun kriteria. Untuk tujuan ini dipertimbangkan penggunaan test prestasi belajar maupun test psikologis (Dep. P dan K, 1975-1976).

Alasan-alasan pro dan kontra penggunaan test prestasi belajar versus test psikologis a.l. dikemukakan oleh Drenth (1977a). Kedua-duanya mempunyai kekuatannya maupun kelemahannya, kedua-duanya saling melengkapi sehingga apabila mungkin sebaiknya kedua-duanya dipakai. Dalam penggunaan test prestasi belajar diperlukan bukti empiris bahwa ada hubungan antara prestasi pada sekolah yang telah dilampaui dengan proses belajar pada tingkat pendidikan berikutnya. Begitu pula, test aptitude harus dapat menunjukkan korelasi substansiil dengan kriteria yang relevan terhadap hasil belajar di sekolah yang akan dimasuki. Penggunaan test prestasi belajar disarankan untuk tujuan seleksi dan penerimaan murid dengan menetapkan standar minimal untuk dapat diterima. Tetapi bila jumlah murid yang memenuhi syarat penerimaan minimal melebihi jumlah tempat yang tersedia (sebagaimana sering halnya di Indonesia), maka seleksi sebaiknya dilakukan berdasarkan test kemampuan (aptitude).

3. DASAR PEMIKIRAN DAN TUJUAN DARI STUDI

Design dari pada studi didasarkan atas pertimbangan sbb:

1. Pertama-tama dirasakan kebutuhan akan alat alat untuk mengassess proses pemikiran kreatif. Sampai saat ini ukuran kemampuan intelek

terbatas pada test inteligensi yang tradisionil yang berfokus pada pemikiran konvergen. Belum ada alat yang dapat melayani kebutuhan masyarakat untuk mengidentifikasi potensi kreatif.

2. Penelitian yang intensif selama 20 tahun belum berhasil memberi jawaban yang memuaskan terhadap masalah dimensionalitas inteligensi-kreativitas, y.i. apakah ukuran pemikiran divergen ('kreativitas') menunjukkan derajat konsistensi internal yang substansiil lebih tinggi dari pada derajat korelasinya dengan ukuran pemikiran konvergen ('intelligensi').

3. Perso'alan lain yang penting sehubungan dengan implikasinya terhadap pendidikan menyangkut masalah sejauh mana test kreativitas dan test inteligensi menunjukkan korelasi dengan prestasi sekolah, d.p.l. kekuatannya sebagai prediktor.

Berkaitan dengan persoalan ini adalah ketepatan dari teori 'ambang inteligensi' yang menyatakan bahwa mulai taraf inteligensi tertentu ('cut off point' yang diperkirakan sekitar I.Q. 120), kreativitas tidak lagi menunjukkan korelasi dengan inteligensi (atau sangat rendah), d.p.l. pada tingkatan inteligensi yang tinggi belum tentu kreativitas tinggi pula. Implikasinya dalam pendidikan ialah bahwa - terutama pada ratio seleksi yang rendah, sebagaimana halnya pada negara negara yang berkembang, termasuk Indonesia, dimana kebutuhan akan pendidikan jauh melebihi kemungkinan penempatan- sebagian besar dari anak anak dengan potensi kreatif tidak akan terpilih, jika seleksi atau identifikasi dari bakat hanyalah berdasarkan test inteligensi yang tradisionil.

Konsep 'inverted diagnostics' dari Hofstee (1969) menunjuk pada kemungkinan interpretasi lain dari pola korelasi fungsi fungsi kogni-

tif dengan keberhasilan di sekolah, yaitu untuk memberi 'diagnosa' tentang sistem sekolah tersebut. Dalam hal ini test digunakan sebagai 'reference points' untuk memberi keterangan tentang sasaran dan hasil pendidikan (untuk contoh yang praktis mengenai hal ini, lihat Drenth, 1977b).

4. Ahli ahli (a.l. Roe, 1952; Barron, 1955; Guilford, 1959; Mac Kinnon, 1962; Taylor & Ellison, 1964; Cattell & Butcher, 1968) mendapatkan bahwa 'non-aptitude traits', seperti minat, sikap, motivasi, temperament dll. mempunyai peran yang penting dalam hal produktivitas kreatif.

Banyak studi yang telah dilakukan terhadap mereka yang telah di identifikasikan sebagai menonjol kreatif atau studi yang bertujuan mengembangkan teknik (misalnya rating scale, biographical dan personality inventories, attitude scale) untuk membedakan antara mereka yang kreatif dan yang tidak kreatif. Semua studi ini melaporkan cluster dari ciri ciri yang khas untuk kepribadian yang kreatif ('syndrom kreativitas'), a.l. kebebasan dalam pendapat dan sikap, keterbukaan terhadap rangsang, minat yang luas, akseptasi diri, intuitif, fleksibel, kurang mengindahkan norma norma sosial, kepercayaan diri, bersifat ingin tahu, berani mengambil risiko, tidak bersedia menerima pendapat dari otoritas begitu saja (Torrance, 1965; Dellas & Gaier, 1970; Hurlock, 1972).

Kenyataan bahwa kreativites merupakan konstruk yang multi-dimensional, meliputi 'aptitude' maupun 'non-aptitude traits' menuntut bahwa masalah ini perlu ditinjau dari perspektif yang berbeda-beda.

5. Untuk memberi kesempatan optimal bagi potensi anak, yang penting tidak hanya pendidikan yang tepat, tetapi juga sikap dari mereka dengan mana si anak paling sering berhubungan, yaitu orang tua dan guru,

sangatlah menentukan. Jika kita ingin mengembangkan potensi kreatif seorang anak, pertama-tama kita harus dapat menghargai perilaku kreatif. Namun, studi yang dilakukan di beberapa kebudayaan (Torrance, 1965; Bachtold, 1974) menunjukkan bahwa ciri ciri yang dianggap 'ideal' untuk anak didik oleh pendidik, tidak mencerminkan ciri ciri kepribadian yang kreatif. Demikian pula studi dari Getzels & Jackson (1962) menggambarkan bahwa guru lebih menyukai murid dengan I.Q. yang tinggi dari pada murid yang kreatif didalam kelas, walaupun kedua kelompok tersebut tidak berbeda dalam prestasi belajar.

Dirasakan penting untuk meneliti sejauh mana sikap dari pendidik di Indonesia menyokong pengembangan prestasi kreatif pada anak.

Asumsi yang mendasari studi ini:

a. Yang menjadi fokus ialah proses pemikiran kreatif
b. Potensi kreativitas ada pada setiap orang dalam derajat yang berbeda-beda
c. Kreativitas merupakan konstruk yang multi-dimensional
d. Kreativitas merupakan hasil dari proses interaksi yang terus menerus antara individu dan lingkungannya
e. Kemampuan berfikir kreatif adalah suatu proses yang dimanifestasikan dalam kelancaran, fleksibilitas dan originalitas dalam berfikir.

Tujuan umum dari studi ini ialah menarik perhatian terhadap masalah kreativitas: Kebutuhan untuk mengidentifikasikan potensi kreatif dan untuk mengembangkan proses proses pemikiran kreatif pada anak.

Sasarannya ialah mengembangkan suatu baterai test kemampuan berfikir kreatif dan menyelidiki hubungannya dengan:

- dimensi dimensi lain dari fungsi kognitif, yaitu pemikiran konvergen dan daya ingatan jangka pendek (validitas diskriminatif).
- beberapa kriteria dari kreativitas: rating dari guru dan kemampuan menulis (karangan) kreatif (validitas konfirmatif),
- ciri ciri non-aptitude dari kreativitas; untuk tujuan ini telah dikembangkan suatu Skala Sikap Kreatif.
- prestasi sekolah: menilai kekuatan prediktif dari test pemikiran kreatif, dibandingkan dengan test inteligensi dan test daya ingatan,
- sejumlah variabel pribadi dan variabel lingkungan

Disamping itu dilakukan studi dengan mengadaptasikan Ideal Pupil's Checklist dari Torrance untuk melihat sejauh mana sikap pendidik di Indonesia menunjang pengembangan kreativitas anak didik.

Signifikansi dari studi:

1. Identifikasi dari baterai test pemikiran divergen ('kreativitas') membuka perspektif yang lebih luas dari assessment kemampuan intelek.
2. Alat alat yang dikembangkan dalam studi ini (Baterai Kreativitas, Skala Sikap Kreatif, Skema Skoring untuk menilai kemampuan menulis kreatif) dapat melayani kebutuhan untuk mengidentifikasi potensi kreatif. Alat alat tersebut dapat dipakai untuk tujuan seleksi dan penempatan, maupun untuk tujuan praktek diagnostik individuil.
3. Hubungan antara ukuran ukuran kreativitas, inteligensi dan daya ingatan dengan prestasi sekolah tidak hanya memungkinkan untuk menentukan kemampuan prediktif dari ukuran ukuran tersebut terhadap keberhasilan di sekolah, tetapi juga memberikan informasi mengenai sistem pendidikan, sasaran sasaran dan outputnya.

4. Analisa hubungan antara variabel lingkungan dan variabel kognitif memberi indikasi mengenai kondisi lingkungan manakah yang menguntungkan bagi pengembangan kreativitas.
5. Akhirnya studi ini melayani tujuan teoretis dengan membahas masalah masalah dasar dalam bidang kreativitas (masalah dimensionalitas kreativitas-inteligensi, teori ambang inteligensi dsb.).

4. DESAIN DARI STUDI

Baterai Kreativitas yang dikembangkan dalam studi ini terdiri dari enam subtest. Berpegangan pada model Struktur Intelek dari Guilford, ke-enam subtest tersebut tergolong kategori operasi (y.i. pemikiren divergen) dan kategori kontent (y.i. semantis atau verbal) yang sama, tetapi berbeda dalam kategori produk. Setiap subtest mengassess aspek aspek yang lain dari kreativitas. Diusahakan agar prosedur administrasi dan skoring sederhana dan ekonomis, dengan cukup menjamin obyektivitas dalam skoring. Ditentukan batas waktu yang cukup memberi kesempatan pada subyek untuk mengekspresikan ide idenya.

Keenam subtest tersebut ialah: Permulaan Kata, Anagram, Kalimat-Tiga-Kata, Sifat Benda, Penggunaan Luar Biasa dan Apa Akibatnya.

Ketiga test pertama mempunyai kesamaan dalam hal bahwa pada ketiganya subyek harus membentuk kata kata yang memenuhi aturan aturan strukturil tertentu, tetapi pada Anagram disamping itu diperlukan proses pemecahan dan penstrukturan kembali dari huruf huruf dari kata yang diberikan, sedangkan pada Kalimat-Tiga-Kata dibutuhkan proses pengorganisasian dari bahan verbal.

Ketiga test terakhir sama dalam hal bahwa subyek harus memberikan ide-ide sebanyak mungkin, oleh karena itu ketiga test tersebut diklasifi-

kasikan sebagai ukuran 'ideational fluency'. Sifat Benda mengassess kelancaran dalam memberikan ide, Penggunaan Luar Biasa memberikan dua ukuran, yaitu fleksibilitas dan originalitas dalam berfikir, dan Apa Akibatnya mengassess kombinasi dari kelancaran dalam memberikan ide dan elaborasi.

Skala Sikap Kreatif dikembangkan sebagai suatu ukuran 'non aptitude' dari kreativitas. Skala tersebut terdiri dari sejumlah pernyataan yang harus dijawab dengan 'ya' atau 'tidak'. Konstruksi item didasarkan atas tinjauan kepustakaan mengenai sikap, pendapat dan nilai nilai yang khas dari tokoh tokoh yang telah diidentifikasi sebagai kreatif.

Sikap kreatif dioperasionalisir dalam dimensi dimensi sbb.:

- keterbukaan terhadap pengalaman baru dan luar biasa
- Fleksibel dalam berfikir
- Kebebasan dalam ekspresi dan pernyataan
- Menghargai fantasi
- Minat terhadap aktivitas kreatif
- Kepercayaan terhadap gagasan sendiri
- Kebebasan dalam penilaian

Ideal Pupil Checklist dari Torrance (1965) telah diadaptasikan untuk studi ini, yaitu untuk melihat sejauh mana persepsi guru dan orang tua tentang murid yang ideal mencerminkan kepribadian yang kreatif. Asumsi yang mendasari ialah bahwa perilaku yang dianggap sebagai ideal oleh pendidik akan dirangsang dan dikembangkan. Dengan demikian sejauh mana ciri ciri yang dipandang sebagai ideal menyerupai ciri ciri pribadi yang kreatif, kreativitas pada anakdidik akan di-

kembangkan.

Skema skoring analitis untuk mengassess kemampuan menulis kreatif telah dikembangkan sebagai salah satu kriterium dari ukuran ukuran pemikiran divergen (untuk tujuan validitas konfirmatif). Skema skoring tersebut meliputi empat kriteria dari kreativitas: kelancaran, fleksibilitas, originalitas dan elaborasi. Setiap dari empat kriteria tersebut terdiri dari lima komponen. Dengan demikian skor maksimal yang dapat diperoleh adalah 20.

Penilaian guru mengenai kreativitas murid muridnya merupakan variabel kriterium lainnya. Guru guru diberi beberapa pedoman yang dapat membantu dalam memberi rating, tetapi penilaian dilakukan secara global, dengan membedakan tiga golongan: kreatif, tidak kreatif dan mereka yang tidak dapat digolongkan kedalam kedua golongan pertama tadi. Di SD yang memberi penilaian adalah guru kelasnya, sedangkan di SMP ialah pengajar dari lima mata pelajaran. Lima mata pelajaran tersebut ialah yang termasuk Test Preatasi Belajar yang telah dikembangkan oleh BP3K untuk tujuan penilaian nasional mutu pendidikan di seluruh Indonesia pada tahun 1975 di SD dan 1976 di SMP, dan yang telah digunakan dalam studi kami untuk mengassess prestasi di sekolah, yaitu Bahasa Indonesia, Matematika, Ilmu Pengetahuan Alam, Ilmu Pengetahuan Sosial dan Bahasa Inggeris.

Dalam penyusunan jaringan nomologis seputar konstruk pemikiran divergen, telah dipilih dua dimensi fungsi kognitif lainnya, yaitu pemikiran konvergen (atau konsep inteligensi yang tradisionil) dan daya ingatan jangka pendek. Masing masing meliputi dua ukuran de-

ngan kontent yang berbeda. Variabel kognitif tersebut merupakan kriteria untuk menentukan validitas diskriminatif dari test pemikiran divergen.

Untuk menentukan efek dari perbedaan umur (analisa variansi), dalam studi ini dipilih dua golongan umur, kelas enam SD dan kelas tiga SMP. Murid murid ini menghadapi ujian akhir, sehingga memungkinkan menarik kesimpulan mengenai efek dari sistem pendidikan terhadap pengembangan kemampuan dan sikap. Sampel terdiri dari 129 murid kelas enam SD dan 138 murid kelas tiga SMP dari sekolah sekolah negeri di Jakarta.

Untuk melihat hubungan antara faktor lingkungan dan variabel kognitif (y.i. kreativitas, inteligensi, daya ingatan, prestasi belajar dan penulisan karangan), telah dipilih sejumlah item dari kwesioner yang disusun oleh BP3K untuk keperluan Survey nasional penilaian pendidikan pada tahun 1975.

Dalam studi pendahuluan (Pilot Study) telah dilakukan analisa item dari Baterai Kreativitas dan Skala Sikap Kreatif untuk menentukan item item dari Skala dan Baterai test yang definitif (berdasarkan indeks diskriminasi). Mengenai Baterai Kreativitas ternyata lebih banyak item yang dapat digunakan dari pada yang diperlukan; oleh karena itu diputuskan untuk mempertahankan empat item dalam setiap subtest, yang kemudian dapat dipakai sebagai dua bentuk paralel. Skala Sikap Kreatif yang definitif terdiri dari 32 item.

Berdasarkan model Struktur Intelek dari Guilford sebagai kerangka teoretis dan melihat hasil hasil riset yang didapat dari bahan kepustakaan telah dirumuskan 26 hipotesa:

5 hipotesa menyangkut validitas diskriminatif dari Baterai Kreativitas, 4 hipotesa mengenai nilai prediktif dari test kreativitas, inteligensi dan daya ingatan terhadap prestasi di sekolah, 3 hipotesa berhubungan dengan validitas konfirmatif dari Baterai Kreativitas, 4 hipotesa menyangkut validitas dari Skala Sikap Kreatif, 5 hipotesa berhubungan dengan perbedaan prestasi antara SD dan SMP, dan 5 hipotesa berkisar sekitar persepsi guru dan orang tua mengenai murid yang ideal.

Analisa data terutama berdasarkan metode korelasi dan analisa variansi. Untuk melihat signifikansi perbedaan antara mean dari sample digunakan t-test dan F-test.

Korelasi parsiil dihitung untuk menentukan hubungan antara dua variabel dengan menetralisir pengaruh dari variabel ketiga. Korelasi berganda dihitung untuk melihat efek dari kombinasi dua variabel prediktor terhadap korelasinya dengan variabel kriterium.

Faktor analisa dilakukan berdasarkan matriks interkorelasi dari suatu set variabel test, untuk melihat apakah konstruk yang dihipotesakan dapat diidentifisir, dan apakah validitas konfirmatif dapat diperkuat.

5. HASIL STUDI EMPIRIS

5.1. Studi reliabilitas

Obyektivitas dan reliabilitas dari variabel test telah diuji secara ekstensif.

Mengenai Baterai Kreativitas, interscorer reliability pada ketiga subtest ideational fluency ternyata sangat tinggi, berkisar antara .94 sampai .99. Test-retest reliability dari ke-enam subtest divergen, berkisar antara .65 sampai .75. pada tingkat SD dan dari .68 sampai

.86 pada tingkat SMP, menunjukkan cukup stabilitas. Split-half reliability dikoreksi untuk seluruh test adalah .95, baik di SD maupun SMP; ini tinggi sekali, apalagi mengingat Schoppe (1975) menyatakan bahwa metode belah dua tidak dapat digunakan pada test kreatif, karena itemnya tidak equivalent. Kami berpendapat bahwa metode ini bisa saja diterapkan, apabila dalam penyusunan test, equivalence dari item diperhitungkan.

Tanpa dikoreksi untuk seluruh test, reliabilitas separoh test juga sangat tinggi (.90 pada tingkat SD maupun SMP), berarti bahwa baterai test dapat dibelah menjadi dua bentuk alternatif.

Koefisien reliabilitas dari Skala Sikap Kreatif, berdasarkan metode belah dua, rumus Kuder-Richardson 21, dan metode ulangan test menunjukkan magnitude yang substansiil, dan pada umumnya lebih tinggi di SMP dari pada di SD. Reliabilitas ulangan test yang agak rendah di SD (.38 dibandingkan dengan .68 di SMP) memberi kesan bahwa skala tersebut kurang dapat dipercaya pada tingkat SD, atau bahwa pembentukan sikap belum cukup stabil pada tingkat ini.

Praktis semua dari aspek aspek sikap kreatif yang diasumsikan dapat diidentikasi melalui teknik analisa faktor. Tetapi nyata pula bahwa sebagian dari variansi tidak termasuk enam faktor yang diidentifikasi, dan bahwa banyak dari item mempunyai arti yang unik. Hal ini tidak mengurangi kegunaan dari Skala Sikap Kreatif, karena skala tersebut dimaksudkan untuk dipakai secara keseluruhan dan tidak sebagai seri dari sub-skala.

Interrater agreement dalam menskor karangan ternyata tinggi, baik berdasarkan metode analitis maupun metode global (berkisar antara

.67 sampai .99) tetapi dengan metode analitis reliabilites agak lebih tinggi, sesuai dengan hasil-hasil studi di luar negeri (Wesdorp, 1969).

5.2. Validitas diskriminatif dari Baterai Kreativitas

Sesuai dengan dugaan, interkorelasi antara ukuran ukuran pemikiran divergen (.54 dan.51 di SD dan di SMP) signifikan lebih tinggi dari pada korelasinya dengan ukuran konvergen (.36 dan .33 di SD dan SMP) dan dengan ukuran daya ingatan (.20 dan .21 di SD dan SMP).

Korelasi yang relatif rendah dengan ukuran pemikiran konvergen sebagian disebabkan karena korelasinya yang rendah dengan Eksklusi Gambar (ukuran konvergen figural); korelasinya yang lebih tinggi dengan Hubungan Kata (ukuran konvergen verbal) mengesankan bahwa ini terjadi karena kesamaan dalam unsur verbalnya. Namun korelasi dengan Circle Test (divergen figural) menunjukkan bahwa hubungan yang substansiil antara ukuran pemikiran divergen dan Hubungan Kata tidak semata-mata disebabkan oleh kesamaan dalam faktor verbalnya, karena Circle Test korelasinya juga lebih tinggi dengan Hubungan Kata dari pada dengan Eksklusi Gambar.

Hasil hasil studi di luar negeri menemukan bahwa kemampuan untuk berfikir secara analogis (yaitu yang diassess oleh Hubungan Kata) merupakan unsur yang essensiil dan fundamentil dari pemikiran kreatif (Ribot, 1906), dan ini dapat menerangkan korelasi yang substansiil antara Hubungan Kata dan ukuran pemikiran divergen, dan tidak semata-mata faktor verbalnya.

Hasil hasil dari analisa faktor membenarkan identifikasi dari variabel pemikiran divergen sebagai dimensi tersendiri yang relatif bersatu. Disamping itu multi-dimensionalitas dari konstruk kreati-

vitas juga menjadi nyata. Misalnya variabel 'word fluency' menunjukkan loading kedua pada faktor yang diidentifikasikan sebagai 'inteligensi'.

Ternyata ada perbedaan antara ukuran 'word fluency' dan 'ideational fluency', yang pertama menunjukkan common variance secara substansiil dengan ukuran pemikiran divergen dan dengan prestasi sekolah, sedangkan yang terakhir lebih menyatakan bentuk pemikiran yang paling tidak tergantung dari konsep tradisionil dari inteligensi. Ukuran 'ideational fluency' juga menunjukkan interkorelasi yang lebih kuat dari pada ukuran 'word fluency', dan juga korelasi yang lebih tinggi dengan variabel kriterium (rating guru dan skor karangan). Hasil-hasil ini sesuai dengan kesimpulan Wallach (1970) bahwa ukuran 'ideational fluency' merupakan prediktor performance kreatif yang lebih baik dari pada 'word fluency'.

Kesimpulannya, sehubungan dengan masalah dimensionalitas inteligensi-kreativitas, ialah bahwa hasil studi korelasi dan analisa faktor memang membuktikan pemikiran divergen sebagai dimensi fungsi kognitif yang relatif bersatu, tetapi juga menunjukkan hubungan yang signifikan dengan pemikiran konvergen. Ini sesuai dengan konsepsi kreativitas sebagai konstruk yang multi-dimensional.

Setiap aktivitas pemecahan masalah (problem solving) pertama-tama meliputi fase memberikan banyak gagasan (pemikiran divergen), yang perlu diikuti oleh fase memilih secara kritis alternatif atau penyelesaian yang paling tepat (pemikiran konvergen) dan akhirnya perlu ada fase evaluasi dari hasil.

5.3. Validitas konfirmatif dari Baterai Kreativitas

Validasi dari Baterai Kreativitas terhadap variabel kriteria memberikan hasil yang memuaskan. Dengan skor penulisan karangan berdasarkan metode analitis, koefisien validitasnya .35 dan .31 di SD dan SMP, berdasarkan metode global .43 dan .37 di SD dan SMP (signifikan .01). Dengan rating guru - yang sebagai kriterium dari kreativitas sering diragukan, walaupun sebagai prediktor dari prestasi sekolah rupanya cukup memuaskan- , berdasarkan skor total dari Baterai Kreativitas, koefisien validitasnya adalah .38 dan .36 di SD dan SMP (signifikan .01). Jika rating guru dikorelasikan dengan ke tujuh ukuran dari pemikiran divergen, 45 dari 48 koefisien validitas adalah signifikan sekurang-kurangnya pada taraf .05.

Rata rata interrater agreement diantara 15 guru SMP adalah .41. Meskipun angka ini tidak begitu tinggi, namun masih tergolong substansiil, apalagi mengingat kompleksitas dari konstruk kreativitas maupun dari kriteria kreativitas. Studi studi lain di luar negeri sering mendapatkan koefisien validitas dengan rating guru yang jauh lebih rendah, tidak melebihi .20 (Yamamoto, 1965b).

5.4. Prediksi dari prestasi di sekolah

Pola korelasi dari variabel test kognitif (pemikiran divergen, pemikiran konvergen dan daya ingatan) terhadap prestasi di sekolah menunjukkan gambaran yang cukup menggembirakan.

Ukuran pemikiran divergen ('kreativitas') ternyata sama validnya (.68 dan .63 di SD dan SMP) dengan ukuran pemikiran konvergen ('inteligensi', yaitu .72 dan .58 di SD dan SMP) sebagai prediktor dari prestasi di sekolah. Dan kedua-duanya lebih superior dalam kekuatan prediktif-

nya dari pada ukuran daya ingatnn. Hal ini sebetulnya tidak diduga, mengingat hasil dari Laporan Survey Pendidikan (1974) yang menyatakan bahwa 'sekolah menekankan pada hafalan semata-mata'.
Jika efek dari inteligensi di eliminir, untuk mengetahui kontribusi eksklusif dari kreativitas terhadap keberhasilan di sekolah, hubungannya masih tetap substansiil (.45 dan .44 di SD dan SMP). Demikian pula, korelasi inteligensi dengan prestasi sekolah juga substansiil, jika variabel kreativitas dinetralisir.
Penting juga adalah hasil bahwa kombinasi dari inteligensi dan kreativitas lebih efektif sebagai prediktor prestasi sekolah (.78 dan.68 di SD dan SMP), dari pada masing masing ukuran sendiri.

Implikasinya terhadap pendidikan ialah bahwa kedua macam test tersebut dapat digunakan secara terpisah untuk tujuan praktis seperti seleksi dan identifikasi bakat, akan tetapi lebih baik lagi jika menggunakan kombinasi dari keduanya.

Namun perlu diingat bahwa pola korelasi ini belum mengatakan apa apa mengenai taraf prestasi yang absolut. Ada indikasi bahwa pada umumnya taraf pemikiran divergen cenderung rendah, sebagaimana nyata dari mean yang rendah pada kelancaran, flesibilitas dan originalitas dalam pemikiran. Demikian pula mean skor untuk menulis karangan rata rata rendah. Agaknya, memberikan banyak gagasan, melihat suatu masalah dari perspektif yang berbeda-beda, menggunakan imajinasi dan memberikan jawaban yang original, kurang dikembangkan dalam sistem sekolah dewasa ini.
Hal ini sangat perlu diperhatikan, apalagi dimana hasil survey penilaian pendidikan sampai pada kesimpulan yang sama.

Disamping itu, hasil studi ini belum tentu berlaku untuk seluruh Indonesia, karena terbatas pada beberapa sekolah negeri di kota metropolitan seperti Jakarta. Pola korelasi yang kita peroleh mungkin sekali berbeda, jika penelitian dilakukan di daerah rural yang terpencil, dimana fasilitas dan pengalaman pendidikan kurang sekali.

5.5. Konsep 'ambang dari inteligensi'

Konsep ambang inteligensi - didukung oleh penelitian dari Getzels & Jackson (1962), Torrance (1962a), Yamamoto (1964a) dll.- bahwa diatas taraf inteligensi tertentu korelasi antara inteligensi dan kreativitas sangat rendah, mendekati nol- tidak disokong sepenuhnya dalam studi ini. Di tingkat SD korelasi antara skor dari 20% tertinggi pada test inteligensi dan dari 20% tertinggi pada test kreativitas didapatkan setinggi .64 pada tingkat SD, dan serendah .12 pada tingkat SMP. Yang terakhir ini memang sangat menyokong teori ambang inteligensi; namun range yang sangat terbatas pada skor inteligensi golongan 20% tertinggi di tingkat SMP, sebagian dapat menyebabkan korelasi yang rendah dengan skor kreativitas.

Kesimpulan lainnya ialah bahwa jika seleksi berdasarkan 20% yang tertinggi dalam test inteligensi, pada tingkat SD 54% dan pada tingkat SMP 36% dari murid yang tergolong 20% paling tinggi pada test kreativitas tidak akan termasuk.

Secara keseluruhan dapat disimpulkan bahwa reliabilitas dan validitas dari Baterai Kreativitas, maupun kemampuan prediktifnya terhadap prestasi sekolah, dalam studi ini didapatkan memuaskan.

5.6. Skala Sikap Kreatif

Validasi dari Skala Sikap Kreatif dirasakan lebih sulit. Ketepatan dalam memilih kriterium masih diragukan. Skala Sikap lainnya atau rating guru mengenai 'non-aptitude traits' dari kreativitas mungkin lebih relevan. Heterogenitas dari konstruk sikap kreatif (sebagaimana nyata dari studi analisa faktor) menambah kesulitan dalam proses validasi skala tersebut.

Pada tingkat SMP sikap kreatif menunjukkan hubungan substansiil dengan ukuran pemikiran divergen (r=.42), dan dengan penulisan karangan berdasarkan metode analitis (r=.30) maupun berdasarkan metode global (r=.26), hubungannya signifikan pada taraf 1%. Korelasi dengan rating guru juga signifikan (sekurang-kurangnya pada taraf 5%) kecuali dengan rating dari guru bahasa Inggeris.

Pada tingkat SD skor pada Skala Sikap Kreatif menunjukkan korelasi yang signifikan dengan rating guru, akan tetapi tidak dengan skor karangan dan dengan ukuran pemikiran divergen. Hal ini dapat disebabkan oleh karena reliabilitas yang agak rendah dari skala tersebut di SD, dan dapat pula berarti bahwa pada taraf SD sikap kreatif kurang ada hubungannya dengan kemampuan berfikir kreatif, lain halnya dari pada di tingkat SMP.

5.7. Analisa Variansi

Sehubungan dengan tingkat umur dan tingkat sekolah, ternyata ada perbedaan yang signifikan dalam prestasi murid kelas enam SD dan murid kelas tiga SMP pada semua variabel test, kecuali mengingat Angka dan struktur kalimat dalam menulis karangan. Jika berdasarkan skor total, perbedaan prestasi antara SD dan SMP tidak signifikan hanya untuk daya

ingatan. Implikasinya ialah bahwa perkembangan dari ingatan jangka pendek sesudah taraf SD tidak lagi terpengaruh oleh umur dan tingkat sekolah, berbeda halnya dengan pemikiran konvergen, pemikiran divergen dan kemampuan menulis kreatif.

5.8. Persepsi guru dan orang tua mengenai murid yang ideal

Studi studi di luar negeri menunjukkan bahwa sejauh mana potensi kreatif seorang anak dipupuk merupakan fungsi dari sikap guru dan orang tua terhadap kreativitas.

Dalam studi kami ditemukan bahwa guru dan orang tua sependapat (r=.96) mengenai sifat sifat apa yang mereka senangi pada anak. Begitu pula antara expert, -dalam hal ini psikolog- juga ada kesesuaian pendapat yang tinggi (rho= .94) dalam konsepsinya mengenai kepribadian yang kreatif. Akan tetapi sifat sifat yang dianggap ideal oleh orang tua dan guru tidak banyak persamaannya dengan sifat sifat yang khas untuk kepribadian yang kreatif (r=.43 dan .48).

Implikasi dari data tersebut ialah bahwa mereka yang bertanggung jawab terhadap pendidikan anak, perlu menyadari bahwa nilai nilai dan apresiasi mereka dalam mendidik kurang menunjang pengembangan potensi kreatif.

5.9. Hubungan variabel kognitif dengan variabel pribadi dan lingkungan

Tinjauan dari hubungan antara variabel kognitif (kreativitas, inteligensi, daya ingatan, prestasi sekolah dan menulis karangan) dan beberapa variabel pribadi dan lingkungan memberikan hasil yang dapat diringkaskan sbb.:

- Sangat menarik bahwa ditemukan sex tidak merupakan faktor yang mendiskriminir: anak lelaki dan perempuan prestasinya setaraf pada semua variabel test. Apakah hasil ini juga berlaku untuk daerah diluar Jakarta perlu diselidiki lebih lanjut. Survey assessment pendidikan dari BP3K yang dilakukan pada tahun 1975 di seluruh Indonesia tidak menunjukkan perbedaan dalam prestasi sekolah antara lelaki dan perempuan.
- Umur menunjukkan hubungan yang terbalik dengan hasil test kelompok anak yang lebih muda didalam satu kelas hasilnya lebih baik dari pada kelompok anak yang lebih tua.
- Sehubungan dengan besarnya suatu keluarga ditemukan bahwa pada tingkat SD anak tunggal berada dalam posisi yang lebih menguntungkan mengenai taraf prestasinya. Tetapi secara umum tidak ada perbedaan yang signifikan dalam prestasi anak dari keluarga kecil (1-3 anak) dibandingkan dengan anak dari keluarga besar (lebih dari 3 anak), baik di SD maupun SMP.
- Pendapat umum bahwa memberikan les privat akan meninggikan prestasi anak tidak terbukti dalam studi ini. Namun dalam hal ini ada dua faktor yang saling menetralkan: pertama minat dan kemampuan dari orang tua untuk membeayai anak mereka untuk mengambil les privat dan kedua kemampuan intelek anak dan motivasinya untuk berprestasi.
- Pada umumnya nampak kecenderungan bahwa makin tinggi tingkat pendidikan orang tuanya, makin baik prestasi anaknya. Jika membandingkan prestasi anak yang ayahnya berpendidikan SLTA atau lebih tinggi dengan prestasi anak yang pendidikan ayahnya lebih rendah dari SLTA, maka pada tingkat SD ada perbedaan yang signifikan dalam skor krea-

tivitas, inteligensi, daya ingatan dan prestasi sekolah; tetapi pada tingkat SMP perbedaannya hanya signifikan dalam prestasi sekolah. Yang menarik adalah bahwa pendidikan ibu lebih jelas dan positif hubungannya dengan prestasi anak, dari pada pendidikan ayah. Di SD maupun SMP kelompok anak yang pendidikan ibunya SLTA keatas skornya signifikan lebih tinggi pada kreativitas, inteligensi dan prestasi di sekolah, dari pada kelompok anak yang pendidikan ibunya lebih rendah dari SLTA.

- Bahasa apa yang dipakai di rumah, apakah Bahasa Indonesia, bahasa daerah atau campuran, tidak nampak ada hubungan dengan prestasi anak.
- Anak Indonesia, sebagaimana ternyata dari kwesioner, tergolong sangat rajin: 66% bekerja lebih dari satu jam sehari untuk membuat pekerjaan rumah. Pada umumnya tak ada hubungan yang signifikan antara jumlah waktu untuk membuat pekerjaan rumah dan prestasi test.
- Tempat tersendiri untuk belajar agaknya tidak penting untuk berprestasi lebih baik.
- Pada tingkat SD kecenderungannya ialah bahwa perhatian dan pengawasan orang tua terhadap pekerjaan rumah anak menunjukkan hubungan yang positif dengan anak, akan tetapi pada tingkat SMP, anak tidak memerlukan pengawasan orang tua untuk berprestasi baik. Bahkan nampak kecenderungan bahwa antara pengawasan yang ketat dan prestasi anak ada hubungan yang terbalik.
- Sejauh mana keluarga mampu menyediakan fasilitas tertentu untuk anak (seperti lengganan surat kabar, televisi dan buku bacaan) menunjukkan hubungan yang positif dengan tingkat prestasi anak.
- Mengenai kegiatan waktu senggang: membaca, bercakap-cakap dan ber-

main mempunyai efek yang lebih positif terhadap skor kreativitas dari pada mendengarkan radio, melihat televisi dan membantu orang tua.

- Sehubungan dengan sikap orang tua dalam pendidikan, data menunjukkan bahwa perhatian merupakan determinan yang positif dari prestasi kreatif seorang anak, akan tetapi bahwa pendekatan yang otoriter mempunyai efek sebaliknya terhadap prestasinya.

- Terlalu banyak ikut campur dari fihak orang tua, misalnya terhadap cara berbicara anak, minat anak terhadap membaca, dalam menentukan peraturan di rumah, tidak menghasilkan tingkat prestasi yang lebih tinggi pada kreativitas.

Hasil hasil ini pada umumnya memperkuat teori teori dimana kreativitas dikonsepsikan sebagai bertentangan dengan sifat otoriter (Gowan, 1967b) , bahwa kreativitas merupakan manifestasi dari aktualisasi diri individu yang berfungsi sepenuhnya (Maslow, 1959), dan bahwa kreativitas dapat berkembang dalam suasana non otoriter, yang memungkinkan individu untuk berfikir dan menyatakan diri secara bebas, dan dimana sumber dari pertimbangan evaluatif adalah internal (Rogers, 1973).

6. KATA PENUTUP

Pada bab terakhir telah dikemukakan beberapa masalah yang masih memerlukan penelitian lebih lanjut serta beberapa saran saran.

Dari 26 hipotesa yang diuji dalam studi ini, 21 dapat diterima yaitu empat hipotesa yang menyangkut hubungan antara ukuran pemikiran divergen, pemikiran konvergen dan daya ingatan, empat hipotesa yang menyangkut hubungan antara kreativitas, inteligensi, daya ingatan

dengan prestasi sekolah, tiga hipotesa yang menyangkut hubungan antara test kreativitas dengan kriteria ekstern, lima hipotesa yang menyangkut prestasi dari murid murid SD dibandingkan dengan murid murid SMP, dan lima hipotesa yang menyangkut persepsi murid yang ideal oleh guru dan orang tua.

Empat hipotesa mengenai Skala Sikap Kreatif dapat diterima hanya pada tingkat SMP; sedangkan hipotesa bahwa ada perbedaan yang signifikan dalam daya ingatan jangka pendek antara kelompok SD dan SMP harus di tolak.

Hasil studi ini dapat dikatakan memuaskan, tidak hanya karena alat alat test yang telah dikembangkan ternyata cukup reliable dan valid, tetapi juga karena telah memberikan informasi mengenai sistem pendidikan yang berlaku di Indonesia.

Skala Sikap Kreatif dapat dipakai pada tingkat SMP. Diperlukan penelitian lebih lanjut untuk memperkuat validitasnya, terutama pada tingkat SD.

Baterai Kreativitas siap untuk dipakai pada anak anak dari SD dan SMP. Data normatif sementara telah ditetapkan. Baterai tersebut dapat juga dipakai untuk mahasiswa dan orang dewasa (saat ini sedang dicobakan), apabila data normatif selesai dikumpulkan.

Skala Sikap Kreatif dan Baterai Kreativitas berguna untuk tujuan seleksi dan penerimaan, dan untuk praktek diagnostik individuil. Disamping itu dapat juga digunakan untuk penelitian lebih lanjut mengenai kreativitas dan dalam studi mengenai hubungan antara kreativitas dan sasaran pendidikan serta praktek pendidikan.

Jika kreativitas hendak lebih banyak dikembangkan dalam sistem

pendidikan di Indonesia, maka disamping kemampuan berfikir konvergen dan daya ingatan, lebih banyak perhatian harus diberikan terhadap kemampuan berfikir kreatif dalam merumuskan sasaran sasaran pendidikan. Pertama-tama sasaran pendidikan dan kurikulum perlu dianalisa untuk mengetahui fungsi fungsi mental apakah yang dituju dalam pendidikan kita, dan diusahakan kurikulum yang meliputi fungsi fungsi mental yang luas, termasuk pemikiran kreatif, disamping itu cara cara baru dalam penyajian bahan pelajaran. Guru dapat merangsang pemikiran kreatif misalnya dengan memberi kesempatan pada murid untuk mengajukan pertanyaan, untuk melihat suatu masalah dari perspektif yang berbeda-beda dan untuk memikirkan penyelesaian alternatif terhadap suatu masalah. Fungsi dari buku teks hendaknya terutama sebagai pengantar, yang merangsang murid untuk menjajaki dan menyelidiki lebih lanjut. Dan akhirnya, sistem evaluasi dari sekolah perlu juga memberi penghargaan pada prestasi kreatif. Seperti dikatakan oleh Plato: 'What is honoured in a culture will be cultivated there.'

Harapan kami ialah bahwa studi ini dapat merangsang penelitian penelitian yang lebih lanjut dalam bidang kreativitas yang begitu menarik dan merupakan tantangan bagi kita semua.

BIBLIOGRAPHY

Allport, G.W., Personality; a psychological interpretation.
Henry Holt, New York, 1954.

Allport, G.W., Pattern and growth in personality.
NYC, Holt, 1961.

Anastasi, A. & Schaefer, C.E., Note on the Concepts of Creativity and Intelligence. Journal of Creative Behavior, 1971, 5, 2.

Anastasi, A. Psychological Testing.
Collier MacMillan International Edition, New York, 1976.

Anderson, H.H. (ed.), Creativity and its Cultivation.
Harper, New York, 1959.

Anderson, J.E., The Nature of Abilities.In: Torrance, E.P. (ed.),
Education and talent. University of Minnesota, Minneapolis, 1960.

Arnold, J.E., Education for Innovation. In: Parnes, S.J. & Harding, H.F. (eds.), A Source Book for Creative Thinking. Charles Scribner, New York, 1962.

Bachtold, L.M., The Creative Personality and the Ideal Pupil Revisited.
Journal of Creative Behavior, 1974, 8, 1, 47-54.

Barbe, W.B., & Renzulli, J.S. (eds.), Psychology and the Education of the Gifted. Irvington Publishers, New York, 1975.

Barron, F., The Disposition toward Originality. Journal of Abnormal and Social Psychology, 1955, 51, 478-485.

Barron, F., The Psychology of Creativity. In: Newcomb, T.M. (ed.), New Directions in Psychology II. NYC: Rinehart, 1965.

Barron, F., Originality in Relation to Personality and Intellect.
In: Barbe, W.B. & Renzulli, J.S. (eds.), Psychology and the Education of the Gifted. Irvington Publishers, New York, 1975.

Bartlett, F.C., Adventurous Thinking. In: Vernon, P.E. (ed.), Creativity.
Penguin Books Inc., Baltimore, 1973.

Bartlett, E.W. & Smith, C.P., Child rearing practices, birth order and the development of achievement related motives.
Psychological Reports, 1966, 19, 207-216.

Beittel, K.R., Creativity in the visual arts in higher education. In: Taylor, C.W. (ed.), Widening horizons in creativity. Wiley, New York, 1964, 379-395.

Bereiter, C., Verbal and Ideational Fluency in superior tenth grade students. Journal of Educational Psychology, 1960, 51, 337-345.

Boring, E.G., Great men and scientific progress. Proc. Amer. Phil. Soc. 1950, 94, 339-351.

B.P.P., Pedoman Proyek Penilaian Nasional Pendidikan. Dep. P dan K., Jakarta, 1971.

B.P.P., Office of Educational Development, Educational Evaluation and Testing. Ministry of Education and Culture, Jakarta, 1975.

BP3K., (Office of Educational and Cultural Research and Development), The Education Sector. A Review of Fact and Comment regarding the current status of Education in Indonesia. Ministry of Education and Culture, Jakarta, 1976a.

BP3K., (Office of Educational and Culture Research and Development), National Assessment of the Quality of Indonesian Education. Ministry of Education and Culture, Jakarta, 1976b.

BP3K., Pendidikan di Indonesia (1900 - 1974). Dep. P dan K., Jakarta, 1976c.

BP3K., Rangkuman Statistik Persekolahan. Dep. P dan K., Jakarta, 1977.

Bronowski, J., The Creative Process. Scientific American, 1958, 199, 59-65.

Bruno, F.J., Psychology: a Life-centered Approach. Hamilton Publ. Comp., California, 1974.

Burt, C.L., Critical Notice. In: Vernon, P.E. (ed.), Creativity. Penguin Books Inc., Baltimore, 1973.

Campbell, D.T., & Fiske, D.W., Convergent and Discriminant Validation by the Multitrait- Multimethod Matrix. In: Jackson. D.N., & Messick, S., Problems in Human Assessment. MacGraw Hill, New York, 1967.

Cattell, R.B. & Butcher, H.J., The Prediction of Achievement and Creativity. Bobbs - Merrill, 1968.

Christensen, P.R. & Guilford, J.P., An Experimental Study of Verbal Fluency Factors. Brit. Journal Stat. Psychol., 1963, 16, 1-26.

Cicirelli, U.G., The relationship between measures of creativity, IQ and academic achievement: Interaction and threshold effects. Doctoral dissertation, University of Michigan, 1964.

Clarizo, H.F. (ed.), Contemporary Issues in Educational Psychology. Allyn & Bacon Inc., 1970.

Cline, V.B., Richards, J.M. & Abe, C., The Validity of a Battery of Creativity Tests in a High School Sample. Educational and Psychological Measurement, XXII, 4, 1962.

Cox, C.M., Genetic Studies of Genius. Vol.II. The Early Mental Traits of three hundred Geniuses. Stanford CA: Stanford University Press, 1926.

Crockenberg, S.B., A Validity Study of Two Creativity Tests. University of California, 1971.

Crockenberg, S.B., Creativity Tests: a Boon or Boondoggle for Education? Review of Educational Research, 1972, 42, 1.

Cronbach, L.J. & Meehl, P.F., Construct Validity in Psychological Tests. Psychol. Bulletin, 1955, 52, 4, 281-302.

Cronbach, L.J., Educational Psychology. Harcourt, Brace & World, New York, 1963.

Cronbach, L.J., Essentials of Psychological Testing. Harper & Row, New York, 1970.

Cronbach, L.J., Test Validation. In: Thorndike, R.L. (ed.), Educational Measurement. American Council on Education, Washington D.C., 1971, 443-507.

Cronbach, L.J. & Drenth, P.J.D., Mental Tests and Cultural Adaption. The Hague, Mouton Publ. 1972.

Daroesman, R., Finance of Education. Part II. Bulletin of Indonnesian Economic Studies, 1972.

Davidon, R.S. & Longo, N., Conceptual Development reflected in Age Differences in Associations to Names and Pictures of Objects. Journal of Genetic Psychology, 1960, 96, 85-92.

Dellas, M. & Gaier, E.L., Identification of the Creative Individual. Psychological Bulletin, 1970, 73, 55-73.

Departemen P & K, Pedoman Pelaksanaan Program Pembinaan Bakat dan Prestasi, 1975-1976.

Diederich, P.B., French, J.W. & Carlton, S.T., Factors in the Judgement of Writing Ability. Research Bulletin, R.B., 61-65. Educational Testing Service, Princeton, New York, 1961.

Dissinger, J.K. & Arnold, C.R., Studies in the Psychological Foundation of Exceptionality. Wadsworth Publ. Co. California, 1975.

Drenth, P.J.D. & van der Flier, H., Culturele Verschillen en de vergelijkbaarheid van testprestaties. In: Drenth, P.J.D., Willems, P.J. & de Wolff, Ch. J., Arbeids en Organisatie Psychologie. Kluwer, Deventer 1973.

Drenth, P.J.D., Inleiding in de Testtheorie. Van Loghum Slaterus, Deventer, 1975a.

Drenth, P.J.D., Psychological Tests for Developing Countries: Rationale and Objectives. Ned. Tijdschrift v. Psychologie, 1975b, 30, 5-22.

Drenth, P.J.D., Prediction of School Performance in Developing Countries. Journal of Cross-Cultural Psychology, 1977a, 8, 1, 49-70.

Drenth, P.J.D., The Use of Intelligence Tests in Developing Countries. In: Poortinga, J.H. (ed.), Basic Problems in Cross-Cultural Psychology. Swets and Zeitlinger, Amsterdam, 1977b.

Drevdahl, J.E., Factors of Importance for Creativity. Journal of Clinical Psychology, 1956, 12, 21-26.

Drevdahl, J.E., Some Development and Environmental Factors in Creativity. In: Taylor, C.W. (ed.), Widening Horizons in Creativity. NYC, Wiley, 1964.

Duncher, K., On Problem Solving. Psychological Monographs, 1945, 58, 270.

Dudeck, S.Z., Creativity in Young Children - Attitudes or Ability? Journal of Creative Behavior, 1974, 8, 4, 282-292.

Dunnette, M.D. Personnel Selection and Placement. Wadsworth Publishing Company, Belmont, California, 1966.

Elley, W., Educational Testing and Evaluation in Indonesia. BP3K, Jakarta, 1974.

Ferguson, G.A., Statistical Analysis in Psychology and Education. MacGraw Hill, New York, 1971.

v.d. Flier, H. & Drenth, P.J.D., Fair Selection and Comparability of Test scores. Third International Symposium on Educational Measurement. Leiden, 1977.

Frederiksen, N. & Ward, W.C., Development of Measures for the Study of Creativity. Educational Testing Service, Princeton, New Jersey, 1975.

Freud, S., The Unconscious. Collected Papers, Vol. 4. The Hagarth Press, London, 1949.

Gallagher, J.J., Productive Thinking. In: Hoffman, M.L. & Hoffman, L.W.(eds.), Review of Child Development Research. Russel Sage Foundation, USA, 1971.

Garrett, H.E. & Woodworth, R.S., Statistics in Psychology and Education. Longmans, Green & Co. New York, 1961.

Getzels, J.W. & Jackson, P.W., The Meaning of "Giftedness". An Examination of an Expanding Concept. Phi Delta Kappan, 1958, 40, 41-51.

Getzels, J.W. & Jackson, P.W., Creativity and Intelligence. Explorations with Gifted Students. Wiley & Sons, Inc. New York, 1962.

Getzels, J.W. & Jackson, P.W., The highly Intelligent and the highly Creative Adolescent. In: Vernon, P.E., Creativity. Penguin Books Inc., Baltimore, 1973.

Ghiselin, B., The Creative Process. NYC: Mentor, 1955.

Golann, S.E. The Psychological Study of Creativity. Psychological Bulletin, 1963, 60, 548-565.

Goldman, R.J. & Clarke, D.F., The Minnesota Tests of Creative Thinking. A note on scorer reliability in follow-up studies with English primary school children. In: British Journal of Educational Psychology. 1967, 37, 115-117.

Goldner, R.H., Individual differences in whole-part approach and flexibility-rigidity in problem solving. Psychological Monographs, 1957, 71, 21.

Gowan, J.C., Demos, G.D. & Torrance, E.P. (eds.), Creativity: its Educational Implications. Wiley & Sons, Inc. New York, 1967a.

Gowan, J.C., What makes a gifted child creative? Four Theories. In: Gowan, J.C., Demos, G.D. & Torrance, E.P., Creativity: its Educational Implications. Wiley & Sons, Inc. New York, 1967b.

Gowan, J.C., Some newer Theoretical Implications for Creative Learning. In: Gowan, J.C., Demos, G.D. & Torrance, E.P. (eds.), Creativity, its Educational Implications. Wiley & Sons, Inc. New York, 1967c.

Guilford, J.P., Creativity. In: The American Psychologist, 1950, 5, 9, 444-454.

Guilford, J.P., The Structure of Intellect. Psychological Bulletin, 53, 2 267-293, 1956.

Guilford, J.P., Traits of Creativity. In: Anderson, H.H., (ed.), Creativity and its Cultivation. Harper, 1959, 142-161.

Guilford, J.P., Creativity: its Measurement and Development. In: Parnes, S.J. & Harding, H.F. (eds.), A Source Book for Creative Thinking. Scribners, New York, 1962.

Guilford, J.P., Factors that aid and hinder Creativity. In: Gowan, J.C., Demos, G.D. & Torrance, E.P. (eds.), Creativity, its Educational Implications. Wiley & Sons, Inc. New York, 1967, 107-123.

Guilford, J.P., Creativity: Retrospect and Prospect. Journal of Creative Behavior, 1970, 4, 3, 149-168.

Guilford, J.P., Some Misconseptions Regarding Measurement of Creative Talents. Journal of Creative Behavior, 1971, 2, 2.

Guilford, J.P. & Hoepfner, R., The Analysis of Intelligence. MacGraw-Hill, New York, 1971.

Guilford, J.P. & Christensen, P.R., The One-Way Relation between Creative Potential and I.Q. Journal of Creative Behavior, 1973, 7, 4.

Guilford, J.P., Theories of Intelligence. In: Wolman, B.B. (ed.), Handbook of General Psychology. Prentice Hall, New Jersey, 1973, 630-643.

Guilford, J.P., Three Facets of Intellect. In: Barbe, W.B. & Renzulli, J.S., Psychology and Education of the Gifted. Irvington Publ. New York, 1975.

Haddon, F.A. & Lytton, H., Teaching Approach and the Development of Divergent Thinking Abilities in Primary Schools. British Journal of Educational Psychology, 1968, 38, 171-180.

Haefele, J.W., Creativity and Innovation. Reinhold Publishing Corporation. New York, 1962.

Hall, E.T., The Hidden Dimension. Garden City, New York, Doubleday, 1966.

Hallman, R.J., The Necessary and Sufficient Conditions of Creativity. In: Gowan, J.C., Demos, G.D. & Torrance, E.P. (eds.), Creativity: its Educational Implications. Wiley & Sons, Inc. New York, 1967.

Harvey, O.J., Hoffmeister, J.K., Coates, C. & White, B.J., A Partial Evaluation of Torrance's Test of Creativity. American, Educational Research Journal, 1970, 7, 359-372.

Hasan, P., & Butcher, H.J., Creativity and Intelligence: a partial Replication with Scottish Children of Getzels' and Jackson's Study. British Journal of Psychology, 1966, 57, 129-135.

Hays, W.L., Statistics for Psychologists.
Holt, Rinehart & Winston, New York, 1963.

Hoffman, M.L. & Hoffman, L.W.(eds.), Review of Child Development Research.
Russel Sage Foundation, USA, 1971.

Hofstee, W.K.B., Individuele verschillen en averechtse toepassing.
Ned. Tijdschrift voor de Psychologie, 24, 1969.

Holland, J.L., Some Limitations of Teacher Ratings as Predictors of Creativity. Journal of Educational Psychology, 1959, 50, 219-223.

Hollingworth, L., Gifted Children, Their Nature and Nurture.
Macmillan, New York, 1926.

Hullbeck, C.R., The Creative Personality.
American Journal of Psychoanalysis, 1945, 5, 49-58.

Hurlock, E.B., Child Development.
MacGraw-Hill, London, 1972.

Jones, C.A., Some Relationships between Creative Writing and Creative Drawing of Sixth grade Children. Pennsylvania State University, 1960.

King, L.D., Personality and Aesthetics: Two Studies of Poetic Communication.
University of North Carolina, Chapel Hill, 1969.

Klenz, W., The City and the Creative Individual. In: Stipe, R.E. (ed.), Perception and Environment: Foundation of Urban Design. University of North Carolina, Chapel Hill, 1966, 49-53.

Kogan, J. (ed.), Creativity and Learning.
Houghton Mifflin Co. Boston, 1967.

Kogan, N. & Morgan, F.T., Task and Motivational Influences on the Assessment of Creative and Intellective Ability in Children.
Genetic Psychology Monographs, 1969, 80, 91-127.

Krause, R., Kreativität, Untersuchungen zu einem problematischen Konzept.
W. Goldmann-Verlag, München, 1972.

Kris, E., On Preconscious Mental Processes.
Psychoanalytic Quarterly, 1950, 19, 542.

Lembright, M.L. & Yamamoto, K., Subcultures and Creative Thinking: an exploratory Comparison between Amish and Urban American School Children. Merill-Palmer Quart., 1965, 11, 49-64.

Livingstone, R., The Future in Education.
Cambridge University Press, 1944.

Long, B.H. & Henderson, E.H., Opinion Formation and creativity in elementary children, University of Delaqare, 1964.

Lowenfeld, V., What is Creative Teaching? In: Torrance, E.P. (ed.), Creativity: Proceedings of the Second Minnesota Conference on Gifted Children. Minneapolis: University of Minnesota Press, 1959.

Lowenfeld, V., Creativity: Education's Stepchild. In: Parnes, S.J. & Harding, H.F. (eds.), A Source Book for Creative Thinking. Scribner's Sons. New York, 1962.

MacCandless, B.R. & Evans, E.D., Children and Youth: Psychosocial Development. Dryden Press, Illinois, 1973.

MacClelland, D.C. & Steele, R.S., Human Motivation.
General Learning Press, New Jersey, 1973.

MacDonald, F.J., Educational Psychology.
Wadsworth Publ. Co., San Francisco, 1959.

MacElvain,J.L., Fretwell, L.N. & Lewis, R.B., Relationship between Creativity and Teacher Variability. In: Gowan, J.C., Demos,G.D. & Torrance, E.P. (eds.), Creativity: its Educational Implications. Wiley, New York, 1967, 271-72.

MacKinnon, D.W., The Personality Correlates of Creativity: A Study of American Architects. In: Vernon, P.E. (ed.), Creativity. Penguin Books Inc., Baltimore, 1973, 289-311.

MacKinnon, D.W., The Nature and Nurture of Creative Talent.
American Psychology, 1962, 17, 484-495.

MacKinnon, D.W., Personality and the Realization of Creative Potential.
American Psychology, 1965, 20, 4.

MacKinnon, D.W., What makes a person creative?
Theoryinto Practice, 1966, 5, 152-156.

MacPherson, J.H., A Proposal for establishing Ultimate Criteria for measuring Creative Output. In: Taylor, C.W. & Barron, F. (eds.), Scientific Creativity. Wiley, New York, 1963, 24-29.

Maddi, S.R., Motivational Aspects of Creativity.
Journal of Personality, 1965, 33, 330-347.

Maltzman, I., Simon, S. & Licht, L., The Persistence of Originality Training Effects. University of California, Department of Psychology, Technical Report no.4, 1959.

Mar'i, S.K., Toward a Cross Cultural Theory of Creativity.
Journal of Creative Behavior, 1976, 10, 2, 108-116.

Maslow, A.H., Creativity in Self-Actualizing People. In: Anderson, H.H. (ed.), Creativity and its Cultivation. Harper, New York, 1959.

Maslow, A.H., Towards a Psychology of Being.
Van Nostrand, Princeton, New Jersey, 1962.

Mead, M., Creativity in Cross Cultural Perspective. In: Anderson, H.H. (ed.), Creativity and its Cultivation. Harper, New York, 1959.

Mednick, S.A., The Associative Basis of the Creative Process.
Psychol. Rev., 1962, 69, 220-232.

Minister of Education and Culture, Paper delivered at the Conference of District Heads and Fourth Conference of Muhammadijah Student Associations in Ujungpandang, 23 August 1975 (English Translation).

Munandar, S.C.U., Suatu Tinjauan sekitar masalah-masalah sehubungan dengan kreativitas pada anak. Paper presented at the Sixth Post Graduate Course for Psychologists. Faculty of Psychology, 'Universityof Indonesia, Jakarta, February 1976.

Munandar, S.C.U., Mengembangkan Kreativitas pada anak. Paper presented at a Course in Child Psychology, organized by the Faculty of Psychology, University of Indonesia, Jakarta, August, 1977.

Oden, M.H., The fulfillment of promise: 40-year follow-up of the Terman gifted group. Genetic Psychology Monographs, 1968, 77, 1, 3-93.

Osborn, A.F., Developments in Creative Education. In: Parnes, S.J. & Harding, H.F., A Source Book for Creative Thinking. Scribner's Sons, New York, 1962.

Poincaré, H., The Foundations of Science, Science Press,, 1924.

Parnes, S.J. (ed.), Compendium of Research on Creative Imagination, Creative Education Foundation, Buffalo, New York, 1958.

Parnes, S.J. & Meadow, A., Evaluation of Persistence of Effects produced by a Creative Problem-Solving Course. Psychol. Rep. 1960, 7, 357-361.

Parnes, S.J. & Harding, H.F. (ed.), A Source Book for Creative Thinking. Charles Scribner's Sons, New York, 1962.

Parnes, S.J., Education and Creativity. Teachers College Record., 1963, 64, 331-339.

Rabin, A.I. & Haworth, M.R., Projective Techniques with Children. Grune & Stratton, New York, 1965.

Radina, M.K., A study of sex differences in India. Journal of Creative Behavior, 1969, 3 (2).

Razik, T.A., Psychometric Measurement of Creativity. In: Mooney, R.L. & Razik, T.A. (eds.), Explorations in Creativity. Harper & Row, 1967, 301-309.

Renzulli, J.S. et al., Fluency, Flexibility and Originality as a Function of Group Size. Journal of Creative Behavior, 1974, 8, 1.

Renzulli, J.S., Hartman R.K. & Callahan, C.M., Scale for Rating the Behavioral Charteristics of Superior Students, In: Barbe, W.B. & Renzulli, J.S. (eds.), Psychology and Education of the Gifted. Irvington Publ., New York, 1975.

Rhodes, M., An Analysis of Creativity. Phi Delta Kappan, 1961, 42, 305-310.

Ripple, R.E. & May, F.B., Caution in comparing Creativity and I.Q. Psychol. Rep., 1962, 10, 229-230.

Roe, A., A Psychologist examines sixty-four eminent Scientists. Scientific American, 1952, 187, 21-25.

Rogers, C.R., Towards a Theory of Creativity. In: Anderson, H.H. (ed.), Creativity and its Cultivation. Harper, 1959, 69-82.

Rogers, C.R., Freedom to Learn. Merrill Publ. Comp., Columbus, Ohio, 1969.

Rookey, Th. J., Validation of a Creativity Test: The 100 Students Study. Journal of Creative Behavior, 1974, 8, 3, 211-213.

Schaefer, C.E., Manual for the Creativity Attitude Survey. Psychologists and Educators, Jacksonville, 1971.

Schoppe, K.J., Verbaler Kreativitäts-Test. Ein Verfahten zur Erfassung VERBAL-produktiver Kreativitätsmerkmale. Verlag für Psychologie, Göttingen, 1975.

Sears, P.S., The Effects of Classroom Committee Conditions on the Strength of Achievement Motivation and Work Output in Children. Stanford University Press, 1963.

Sears, P.S., The Study of Development of Children: Research Problems in Parental Antecedents. In: MacCandless, B.R. & Evans, E.D., Children and Youth: Psychosocial Development. Dryden Press, Illinois, 1973.

Setijadi, Educational Planning in Indonesia. Its Organization and Status. Bulletin of the Unesco Regional Office for Education in Asia, no. 16, Bangkok, 1975.

Shapiro, R.J., The Criterion Problem. In Vernon, P.E. (ed.), Creativity. Penguin Books Inc., Baltimore, 1973.

Simpson, R.M., Creative Imagination. American Journal of Psychology, 1922, 33, 234-243.

Slamet Iman Santoso, Pemeriksaan Psychologis sebagai dasar untuk sekolahan. Pidato ilmiah dan pidato pengukuhan sebagai Guru Besar pada Dies Natalis pertama Universitas Indonesia di Bandung, 1952.

Smith, J.A., Setting Conditions for Creative Teaching in the Elementary School. Allyn & Bacon, Inc., Boston, 1966.

Soedijarto, The Modular Instructional System as the Teaching-Learning Strategy in the Indonesian Development School. BP3K, Jakarta, 1976a.

Soedijarto, Kurikulum 1975. Latar belakang, Proses Pengembangan, Ciri-cirinya dan Implikasi Pelaksanaannya. BP3K, Jakarta, 1976b.

Sommers, W.S., The Influence of selected Teaching Methods on the Development of Creative Thinking. Doctoral Dissertation, University of Minnesota, 1961.

Spearman, C.E., The Creative Mind. Appleton-Century, New York, 1930.

Sprecher, T.B., A Proposal for Identifying the Meaning of Creativity. In: Taylor, C.W. & Barron, F., Scientific Creativity: Its Recognition and Development. Wiley, New York, 1963, 77-88.

Stalnaker, J. M., The Construction and Results of a twelve-hour Test in English Composition. School and Society, 1934, 34, 218-24.

Stein, M.I., Problems involved in Predictors of Creativity. In: Taylor, C.W. (ed.), The Third University of Utah Research Conference on the Identification of Creative Scientific Talent. University of Utah Press, Salt Lake City, 1959, 178-186.

Stoddard, G.D., Creativity in Education. In: Anderson, H.H. (ed.), Creativity and its Cultivation. Harper, New York, 1959.

Stein, M.I. & Heinze, S.J., Creativity and the Individual. Summaries of Literature on Creativity. University of Chicago, 1960.

Stein, M.I., A Transactional Approach to Creativity. In: Taylor, C.W. & Barron, F., Scientific Creativity: Its Recognition and Development. Wiley & Sons Inc. New York, 1963.

Tausch, R. & Tausch, A.M., Erziehungspsychologie. Psychologische Vorgänge in Erziehung und Unterricht. Verlag für Psychologie, Göttingen, 1970.

Taylor, C.W. (ed.), Research Conference on the Identification of Creative Scientific Talent, University of Utah Press, 1959.

Taylor, C.W. & Barron, F., Scientific Creativity: Its Recognition and Development. Wiley & Sons Inc. New York, 1963.

Taylor, C.W. (ed.), Creativity, Progress and Potential. MacGraw-hill, New York, 1964a.

Taylor, C.W. (ed.), Widening Horizons in Creativity. Wiley, New York, 1964b.

Taylor, C.W. & Ellison, R.L., Predicting Creative Performance from Multiple Measures. In: Taylor, C.W. (ed.), Widening Horizons in Creativity, Wiley, 1964, 230-240.

Taylor, C.W. & Holland, J., Predictors of Creative Performance. In: Taylor, C.W. (ed.), Creativity: Progress and Potential. McGraw-Hill, New York, 1964.

Taylor, I.A., The Nature of the Creative Process. In: Smith, P. (ed.), Creativity. NYC: Hastings House, 1959, 51-82.

Terman, L.M., Psychological Approaches to the Study of Genius. Papers on Eugenics, 1947, 4, 3-20.

Thorndike, E.L., A Constant Error in Psychological Ratings. Journal of Applied Psychology, 1920, 4, 25-29.

Thorndike, R.L., Some methodological issues in the study of creativity. In: Proceedings of the 1962 invitational conference on testing problems. Princeton, N.J.: Educational Testing Service, 1963, 40-54.

Thurstone, L.L., Primary Mental Abilities. Psychometric Monographs, 1, 1938.

Thurstone, L.L., The Criterion Problem in Personality Research. Psych. Lab. Rep., Chicago, 1952, 78.

Torrance, E.P., Explorations in Creative Thinking in the Early School Years. Bureau of Educational Research. University of Minnesota, 1959.

Torrance, E.P., Conditions for Creative Growth. Bureau of Educational Research, University of Minnesota, 1960.

Torrance, E.P., Developing Creative Thinking through School Expriences. In: Harding, H.F. (ed.), A Source Book for Creative Thinking. Scribner, New York, 1962a.

Torrance, E.P., Causes for Concern. In: Torrance, E.P., Guiding Creative Talent, Prentice-Hall, New Jersey, 1962b.

Torrance, E.P., Education and Creativity. In: Taylor, C.W., Creativity: Progress and Potential. MacGraw-Hill, 1964.

Torrance, E.P., Rewarding Creative Behavior. Experiments in Classroom Creativity. Prentice-Hall, New Jersey, 1965.

Torrance, E.P., Scientific Views of Creativity and Factors affecting its Growth. In: Kogan, J. (ed.), Creativity and Learning. Houghton Mifflin Comp., Boston, 1967a.

Torrance, E.P., Toward the more Humane Education of Gifted Children. In: Gowan, J.C., Demos, G.D. & Torrance, E.P. (eds.), Creativity: its Educational Implications. Wiley & Sons, Inc. New York, 1967b.

Torrance, E.P., Must Creative Development be left to Chance? In: Gowan, J.C., Demos, G.D. & Torrance, E.P. (eds.), Creativity: its Educational Implications. Wiley & Sons, Inc. New York, 1967c.

Torrance, E.P., Give the "Devil" his dues. In: Gowan, J.C., Demos, G.D., & Torrance, E.P. (eds.), Creativity: its Educational Implications. Wiley & Sons, Inc. New York, 1967d.

Torrance, E.P., Torrance Tests of Creative Thinking. Norms Technical Manual. Ginn and Comp., Massachusetts, 1974.

Toynbee, A., Is America neglecting her creative minority? In: Taylor, C.W. (ed.), Widening horizons in creativity. New York, Wiley, 1964, 3-9.

Treffinger, D.J., Ripple, R.E. & Dacey, J.S., Teachers' Attitudes About Creativity. Journal of Creative Behavior, 1968, 2, 4.

Treffinger, D.J., Renzulli, J.S. & Feldhusen, J.F., Problems in the Assessment of Creative Thinking. Journal of Creative Behavior, 1971, 5, 2.

Treffinger, D.J. & Poggio, J.D., Needed Research on the Measurement of Creativity. Journal of Creative Behavior, 1972, 6, 4.

Vernon, P.E. & Millican, G.D., A Further Study on the Reality of English Essays. British Journal of Statistical Psychology, 1954, 7, 65-74.

Vernon, F.E. (ed.), Creativity. Selected Readings. Penguin Books Inc., Baltimore, 1973.

Wade, S., Differences Between Intelligence and Creativity: Some Speculation on the Role of Environment. Journal of Creative Behavior, 1968, 2, 2.

Wallach, M.A., Creativity. In: Mussen, P.H. (ed.), Carmichael's Manual of Child Psychology. Wiley, 1970.

Wallach, M.A. & Kogan, N., A New Look at the Creativity - Intelligence Distinction. J. of Personality, 1965, 33, 348-369.

Wallas, G., The Art of Thought. Jonathan Cape, 1926.

Weisberg, P.S. & Springer, K.J., Environmental factors in creative function. Archives of General Psychiatry, 1961, 5, 554-564.

Welsh, G.S., Perspectives in the Study of Creativity. Journal of Creative Behavior, 1972, 7, 4.

Wesdorp, H., Overzicht van research naar opstel beoordelingstechnieken. Ongepubliceerde scriptie. Amsterdam, 1969.

Wesdorp, H., Het meten van de produktief-schriftelijke taalvaardigheid. Muusses Purmerend, 1974.

Williams, F.E., The Search for the Creative Teacher. In: Gowan, J.C., Demos, G.D. & Torrance, E.P. (eds.), Creativity: its Educational Implications. Wiley & Sons, Inc. New York, 1967.

Wilson, R.C., Creativity. In: Henry, N.B. (ed.), Education for the Gifted. Yearbook of the National Society for the Study of Education, 1958, 57, II, 108-126.

Wilson, R.C., Guilford, J.P. & Christensen, P.R., The Measurement of Individual Differences in Originality. In: Barbe, W.B. & Renzulli, J.S., Psychology and Education of the Gifted. Irvington Publ., New York, 1975.

Witty,P.A., The Education of the Gifted and Creative in the USA. In: Barbe, W.B. & Renzulli, J.S., Psychology and Education of the Gifted. Irvington Publ., New York, 1975.

Yamamoto, K., Scoring Manual for the Creative Writing Project. Preliminary Draft, 1960.

Yamamoto, K., Relationships between Creative Thinking Abilities of Teachers and Achievement and Adjectives of Pupils. Journal of Experimental Education, 1963, 32, 3-25.

Yamamoto, K., A Further Analysis of the Role of Creative Thinking in High School Achievement. Journal of Psychology, 1964a, 58, 277-283.

Yamamoto, K., Creativity and Sociometric Choice among Adolescents. Journal of Social Psychology, 1964b, 64, 249-261.

Yamamoto, K., Creative Thinking: Some Thoughts on Research. Exceptional Children, 1964c, 403-410.

Yamamoto, K., Role of Creative Thinking and Intelligence in High School Achievement. Psychological Reports, 1964d, 14, 783-789.

Yamamoto, K., Evaluation of some Creativity Measures in a High School with . Peer Nominations as Criteria. Journal of Psychology, 1964e, 58, 285-293.

Yamamoto, K., Creativity - A Blind Man's Report on the Elephant. Journal of Counseling Psychology, 1965a, 12, 4.

Yamamoto, K., Validation of Tests of Creative Thinking: A Review of Some Studies. Exceptional Children, 1965b, 31, 6, 281-290.

APPENDIX A

TEST I : WORD BEGINNINGS

Instruction:

Make as many words as possible that begin with the syllable given on the next page.
Look at the following example:

Example:

Sa

---

saya
sakit
Sabang
salam
Salim X
sate

You may write the names of countries, cities, rivers and mountains, but do not write people's names.

Is it clear?
Are there any questions?

Do not start before instructed.

Sample item: pu

TEST II : ANAGRAM

Instruction:

Find as many words as possible using the letters of the words given on the next page.
You may use part of the letters, or you may use all of the letters of the given word, but each letter may be used only once for every new word you make. Do not write people's names.
Look at the following example:

Example

Kotabaru

_____

bata
batu
buta
rata

It is clear?
Are there any questions?

Do not start before instructed!

Sample item: Perumahan

TEST III : THREE-WORD-SENTENCES

Instruction:

Make as many sentences as possible using words that begin with the letters given on the next page.
The sequence of the letters may be altered.
Each sentence may only use one word of the preceding sentences.
Using people's names is allowed.
Look at the following example:

Example:

A - l - g

Gita lagi apa?
Giman anak lucu
Apa Giman lupa?
Gita anak lucu X

The last sentence is not correct, because it contains two words of the proceding sentences.

Is it clear?
Are there any questions?

Do not start before instructed!

Sample item: A - m - p

TEST IV : THING CATEGORIES

Instruction:

On the next page pairs of characteristics are given.
Think of as many things all bearing the same pair of characteristics.
Look at the following example:

Example:

red and liquid

---

blood
rose lemonade
tomato soup

Is it clear?
Are there any questions?

Do not start before instructed!

Sample item: Round and hard

TEST V : UNUSUAL USES

Instruction:

Think of all kinds of uses for common objects outside its common use, for which it is intended.
You do not have to write the object's common use. Think of other possible uses, unusual uses, which you have ever seen, or have used yourself, or which you can imagine.

Example:

For instance a pencil.
We use a pencil to write, to draw; these are common uses and you do not have to write them. But outside these common uses a pensil can also be used as a ruler, or as a measurement instrument, or to scratch an itching back. These are uncommon uses of a pencil.
Try to think of other unusual uses for a pencil.

On the next page several common objects are listed.
Try to think of uncommon, unusual uses for each of these objects.
List as many unusual uses as you can think of.
Use your imagination to find as many uncommon uses as possible.

Is it clear?
Are there any questions?

Do not start before instructed!

Sample item: a broom

TEST VI : CONSEQUENCES

Instruction:

On the next page several sentences are stated, each of which describes a situation which will probably never happen here. Use your imagination to think of what would be the consequences suppose that the situation described were to happen. List all the possible consequences, or what would happen, if the described situation were to come true.

Is it clear?
Are there any questions?

Do not start before instructed!

Sample item: If every one could know the thoughts of other people.

CREATIVE ATTITUDE SCALE

Name : Sex :

Grade : Age :

School : Date :

INSTRUCTION:

For each of the following statements we want you to circle the word 'Yes' if you agree, and the word 'No' if you disagree.

Be sure to answer all the questions, but to circle only one answer each time.

1. Yes No I always like to know new things happening in my surroundings
2. Yes No I like to read make-believe stories.
3. Yes No I think it is better to keep quiet in class than to give ideas that might be wrong.
4. Yes No I like solving problems that have many possible solutions.
5. Yes No In drawing lessons I would rather think up a picture on my own than trace or copy one.
6. Yes No If friends ask me to join playing, I would do it, although actually I prefer doing other things.
7. Yes No I think that the best answers are always the ones the teacher thinks are right.
8. Yes No I like to solve all kinds of puzzles.
9. Yes No I'm reluctant to express my ideas, because I'm afraid they are not right.
10. Yes No I prefer science above social studies.
11. Yes No If two people differ in opinion, usually only one can be right.
12. Yes No I would not easily give up my opinion, although my friends do not agree with me.
13. Yes No I would rather play at places where I often come, than at places that are strange to me.
14. Yes No In acting at the stage, I would rather play different roles than always the same one.
15. Yes No I think daydreaming is always a waste of time.

16. Yes No I like to think up all kinds of possibilities or consequences from situations or events.
17. Yes No I prefer writing a free composition to one of which the title has been fixed.
18. Yes No Studying language is more attractive to me than studying Mathematics.
19. Yes No If friends laugh at my ideas, I would give my ideas up.
20. Yes No I would rather play games that I know well, than learning new games.
21. Yes No There is no use in reading fancy-stories.
22. Yes No I like to try out what I can do with my old toys.
23. Yes No If someone gets an idea that is different from everyones else's, the idea is probably not very good.
24. Yes No I think that for the sake of peace, it is often better not to state your opinion forthright.
25. Yes No I like writing poetry.
26. Yes No Sometimes I imagine strange unusual events, that ordinarily would not take place.
27. Yes No In a group I do not feel free to express my opinion.
28. Yes No I prefer to get ready-made toys (like dolls or cars), above constructive material (like wax, blocks or clay).
29. Yes No Before trying to solve a problem, I first think of alternate possibilities/solutions.
30. Yes No Although I'm sure that I'm right, I will change my opinion, if other people criticize me.
31. Yes No I feel that I have a good imagination.
32. Yes No I like to think up new ways of doing things, rather than doing them in the same old way.

EVALUATION OF CHILDREN'S WRITING (SCORING SCHEME).

The evaluation is based on the four criteria of creativity:

- Fluency
- Flexibility
- Originality
- Elaboration (Richness)

Each criterion comprises five components.
So the maximum score = 20 points.

I. Fluency is defined as the total number of words used in the composition. The title of the composition is not included in the score. According to the number of words the score may range from minimally 1 to maximally 5:

a. less than 50 words : score 1
b. 50 - 99 words : " 2
c. 100 - 149 words : " 3
d. 150 - 199 words : " 4
e. more than 200 words : " 5

II. Flexibility is defined in terms of flexibility in sentence structure and flexibility in content or ideas.

- Flexibility in sentence structure:

a. variety in form of sentence.
Sentences may vary according to form: simple, compound, complex.

b. variety in use of sentence: declarative, interrogative, or exclamatory. Any variation of either type is given credit. This accounts for use as well as for form of sentence.

c. variety in length of sentence: a short sentence contains less than five words, a long sentence consists of more than 10 words. If there is a mixture of short and long sentences, this category is scored.

- Flexibility in content/ideas:

d. imagination: does the subject show rich imagination? Is he able to 'associate away' from the original stimulus, or is he

bound to it? Score one when the subject is able to develop the topic to some extent.

e. fantasy: the criterion is whether the production is strictly on a factual basis or not. The question to be asked in scoring this dimension is: Could this really happen? A production in which animals can talk or humans can fly receive a score of one.

III. Originality: is defined in terms of unusualness of content or style as contrasted to stereotyped.

a. Originality in theme: if the theme is novel or unusual.

b. Original solution or ending: if the ending is unexpected, surprising.

c. Humor: is the production humorous or surprising, amusing?

d. Using self-invented words or names: When parts of two or more words are combined to express some concept, when animals and persons are given amusing names or names appropriate to their character, credit is given in this category.

e. Originality in style of writing: whenever there are any signs of an original style of writing, score one point.

IV. Elaboration (Richness): is defined as the ability to embellish or to 'decorate' the story, to make it more colorful.

a. Picturesqueness in expression: if the writing is colorful, the story told with liveliness, score one point.

b. Emotion: if the production is rich in its expression of emotion. Expression of emotion might be either explicit or implicit. Here we are primarily interested in direct expression of the subject's own emotion.

c. Empathy: on the empathy dimension, we look for explicit emotion ascribed to principal characters.

d. Personal element: whenever there is any self-reference. If the subject involves himself in the event, expresses his opinion or speaks of his own experience.

e. Conversation: direct narrative sentences, using quotations. But with younger children the use of quotation marks is not required. What is essential here is that the direct words of the speaker are given.

GUIDELINES

IDENTIFICATION OF THE CREATIVE PUPIL

To:

teaching grade :
teaching subject :
School :

We need your help in evaluating creativity or creative ability of your pupils.

Here are some points you may consider in your evaluation:

- Who among your pupils is often asking questions?
- Who is always curious (likes to know)?
- Who comes up with the most ideas?
- When facing problems, who thinks of many alternatives for solutions?
- Who is courageous in convictions, in giving his opinion?
- Who shows originality in thinking and behavior?
- Who is talented or has ever produced creative work (e.g. in art-, drawing-, or music lessons); or who has ever won in a competition or contest (class, school, national) for writing compositions, poetry, painting etc.?

Make a list of pupils in your class and proceed as follows:

1. Give a + to those you rate as 'creative'
2. Give a - to those you rate as 'not creative'
3. Those who neither belongs to group 1 or 2, or who do not clearly belongs to any group, you need not give any sign (leave empty).

Example : - Badu
+ Rina
Amin
+ Siti

Thank you for your attention and help.

TEST I : PERMULAAN KATA

Instruksi:

Buatlah sebanyak mungkin kata-kata yang mulai dengan suku kata yang tertulis di kertas.
Perhatikan contoh dibawah ini:

Contoh:

Sa

---

saya
sakit
Sabang
salam
Salim X
sate

Perhatikan: Nama negara, kota, sungai atau gunung boleh dipakai, tetapi jangan menulis nama orang.

Sudah jelas?
Masih ada pertanyaan?

Jangan mulai sebelum diberi tanda!

Sample item : pu

TEST II : MENYUSUN KATA

Instruksi:

Susunlah sebanyak mungkin kata dengan memakai huruf-huruf dari kata yang tertulis di kertas.
Kata-kata tersebut dapat disusun dengan hanya memakai sebagian dari huruf-huruf, atau semua huruf-huruf dari kata yang diberikan. Setiap huruf hanya boleh dipakai satu kali untuk menyusun satu kata baru.
Nama orang tidak boleh dipakai.
Perhatikan contoh dibawah ini:

Contoh:

Kotabaru

---

bata
batu
buta
rata

Sudah jelas?
Masih ada pertanyaan?

Jangan mulai sebelum diberi tanda!

Sample item : Perumahan

TEST III : MEMBENTUK-KALIMAT-TIGA-KATA

Instruksi:

Buatlah sebanyak mungkin kalimat yang terdiri dari tiga kata yang huruf pertamanya diberikan dalam soal.
Urutan huruf-huruf boleh dirubah.
Tiap kalimat hanya boleh memakai satu kata yang telah dipakai pada kalimat-kalimat sebelumnya.
Boleh menggunakan nama orang.
Perhatikan contoh dibawah ini:

Contoh:

A - l - g

Gite lagi apa?
Giman anak lucu.
Apa Giman lupa?
Gita anak lucu. X

Kalimat terakhir tidak berlaku, karena memakai dua kata dari kalimat sebelumnya.

Sudah jelas?
Masih ada pertanyaan?

Jangan mulai sebelum diberi tanda!

Sample item : A - m - p

TEST IV : SIFAT-SIFAT YANG SAMA

Instruksi :

Setiap kali akan diberikan dua sifat benda.
Pikirkan sebanyak mungkin benda (benda mati atau benda hidup) yang semuanya memiliki kedua sifat tersebut.
Perhatikan contoh dibawah ini:

Contoh:

Merah dan cair

---

darah
sirup mawar
sop tomat

Sudah jelas?
Masih ada pertanyaan?

Jangan mulai sebelum diberi tanda!

Sample item : Bulat dan keras

TEST V : PENGGUNAAN LUAR BIASA

Instruksi:

Pada test ini tugasmu ialah: memikirkan untuk apa saja beberapa benda sehari-hari dapat dipakai, kecuali penggunaannya yang lazim, (yang biasa dan sudah umum dipakai setiap orang).
Jadi jangan menulis untuk apa benda itu umumnya atau biasanya digunakan (diperuntukkan). Tetapi pikirkan macam-macam penggunaan lainnya, penggunaan yang tidak lazim, baik yang sudah pernah kau lihat atau kau alami sendiri, maupun yang dapat kau bayangkan.

Contoh:

Misalnya sebuah pensil.
Kita semua tahu bahwa pensil itu dibuat untuk menulis, menggambar, mencatat dsb.nya, jadi sebagai alat tulis menulis. Ini adalah penggunaan yang lazim, dan tidak perlu ditulis.
Tetapi kecuali sebagai alat tulis, pensil dapat juga digunakan sebagai penggaris bila perlu, atau sebagai alat pengukur, atau untuk menggaruk punggung yang gatal.
Ini adalah beberapa penggunaan yang tidak biasa dari pensil, dan inilah yang harus kau pikirkan dan kau tulis.
Coba pikirkan untuk apa lagi pensil itu dapat digunakan.

Pada halaman berikut tercantum beberapa benda sehari-hari.
Untuk setiap benda itu pikirkanlah macam-macam penggunaan yang tidak biasa, dan inilah yang kau tulis.
Gunakan khayalanmu untuk menemukan sebanyak mungkin penggunaan yang tidak biasa.

Sudah jelas apa yang harus kau lakukan?
Masih ada pertanyaan?

Jangan mulai sebelum diberi tanda!

Sample item : Sapu ijuk

TEST VI : APA AKIBATNYA?

Instruksi:

Dalam setiap kalimat yang diberikan pada test ini dilukiskan suatu keadaan yang biasanya tidak terdapat atau tidak mungkin terjadi disini.
Bayangkanlah andaikata keadaan tersebut betul-betul terjadi, apa saja akibatnya?
Tulislah sebanyak mungkin akibat-akibat, atau apa yang akan terjadi jika keadaan itu berlangsung disini.

Sudah jelas?
Masih ada pertanyaan?

Jangan mulai sebelum diberi tanda!

Sample item: Jika setiap orang dapat mengetahui pikiran orang lain.

SKALA SIKAP KREATIP

N a m a : L/P :

Kelas : Umur :

Sekolah : Tanggal :

PETUNJUK :

Pada pernyataan-pernyataan dibawah ini, lingkarilah 'Ya' jika setuju dan 'Tidak' jika tidak setuju dengan pernyataan tersebut.

Pilihlah hanya satu jawaban pada setiap pernyataan dan jawablah semua pernyataan.

1. Ya Tidak Saya selalu ingin mengetahui hal-hal baru yang terjadi disekelilingku.
2. Ya Tidak Saya senang membaca cerita-cerita khayal.
3. Ya Tidak Menurut saya, di kelas lebih baik berdiam diri dari pada memberi jawaban yang salah.
4. Ya Tidak Saya senang mengerjakan soal-soal yang mempunyai bermacam-macam kemungkinan penyelesaian.
5. Ya Tidak Pada pelajaran menggambar saya lebih senang menggambar bebas dari pada menggambar menurut contoh.
6. Ya Tidak Jika diajak untuk ikut main, saya ikuti saja, walaupun sebetulnya saya lebih senang melakukan hal lain.
7. Ya Tidak Menurut saya jawaban terbaik adalah selalu jawaban yang menurut guru adalah benar.
8. Ya Tidak Saya senang untuk mencoba menjawab segala macam teka-teki.
9. Ya Tidak Saya ragu-ragu untuk memberikan pendapat saya, karena takut pendapat saya itu tidak benar.
10. Ya Tidak Saya lebih senang Ilmu Pengetahuan Alam dari pada Ilmu Pengetahuan Sosial.
11. Ya Tidak Jika dua orang berbeda pendapat, maka tentunya hanya satu orang yang benar.
12. Ya Tidak Saya tidak akan cepat melepaskan pendapat saya walaupun tidak disetujui oleh teman-teman.
13. Ya Tidak Saya lebih senang bermain di tempat-tempat yang sudah sering saya datangi, dari pada bermain di tempat-tempat yang belum saya kenal.
14. Ya Tidak Jika main sandiwara saya lebih senang memainkan bermacam-macam peran, dari pada selalu memainkan peran yang sama.

15. Ya Tidak Menurut saya berkhayal adalah selalu membuang waktu.
16. Ya Tidak Saya senang untuk memikirkan macam-macam kemungkinan atau akibat dari keadaan-keadaan atau kejadian-kejadian.
17. Ya Tidak Saya lebih senang membuat karangan bebas, dari pada membuat karangan yang judulnya sudah ditentukan.
18. Ya Tidak Belajar Bahasa bagi saya lebih menarik dari pada belajar Matematik.
19. Ya Tidak Jika usul saya ditertawakan oleh teman-teman, saya akan menarik kembali usul itu.
20. Ya Tidak Saya lebih tertarik memainkan permainan yang sudah saya kenal, dari pada belajar permainan baru.
21. Ya Tidak Membaca cerita khayal tidak ada gunanya.
22. Ya Tidak Saya senang untuk mencobakan apa saja yang dapat saya lakukan dengan mainan saya yang sudah lama.
23. Ya Tidak Jika pendapat seseorang berbeda dari pendapat kebanyakan orang, maka pendapat orang itu biasanya tidak baik.
24. Ya Tidak Menurut saya, demi suasana damai, sering lebih baik untuk tidak mengatakan pendapat sendiri secara terus terang.
25. Ya Tidak Saya senang menulis sajak.
26. Ya Tidak Kadang-kadang saya berkhayal tentang kejadian-kejadian yang aneh, yang sebetulnya tidak mungkin terjadi.
27. Ya Tidak Di dalam kelompok, saya merasa kurang bebas untuk mengemukakan pendapat saya.
28. Ya Tidak Saya lebih senang diberi mainan yang sudah jadi (seperti boneka atau mobil-mobilan) dari pada mainan berupa bahan yang masih harus diberi bentuk sendiri (seperti lilin, balok-balok atau tanah liat).
29. Ya Tidak Sebelum mencoba menyelesaikan suatu persoalan, saya memikirkan macam-macam kemungkinan dulu.
30. Ya Tidak Walaupun saya yakin bahwa pendapat saya benar, saya akan merubah pendapat saya, jika mendapat kritik atau celaan dari teman-teman yang lain.
31. Ya Tidak Saya rasa saya mempunyai daya khayal yang baik.
32. Ya Tidak Saya biasanya senang memikirkan cara-cara baru untuk melakukan sesuatu, dari pada melakukannya dengan cara-cara yang biasa dilakukan.

APPENDIX B

Table IV-1: Item-test correlations based on total subtest-score (ST) and on total test-score (TT), for primary level (N=40)

	item	1	2	3	4	5	6	7	8
Sub Test I	ST	.60	.60	.95	.50				
	TT	.50	.30	.35	.30				
II	ST	.50	.40	.40	.60				
	TT	.40	.30	.10	.30				
IIIA	ST	.40	.40	.60	.30				
	TT	.40	.50	.30	.30				
IIIB	ST	.60	.50	.30	.60				
	TT	.30	.20	.00	.20				
IV	ST	.60	.30	.40	.80	.50	.40		
	TT	.30	.30	.35	.40	.45	.35		
V	ST	.40	.30	.50	.40	.50	.50	.30	.50
	TT	.40	.00	.20	.00	.20	.00	.40	.30
VI	ST	.60	.60	.70	.50				
	TT	.50	.30	.50	.30				

Table IV-2: Item-test correlations based on total subtest-score (ST) and on total test-score (TT), junior secondary level (N=40)

	item	1	2	3	4	5	6	7	8
Sub Test I	ST	.50	.50	.70	.70				
	TT	.30	.50	.40	.30				
II	ST	.80	.60	.40	.80				
	TT	.00	.10	.40	.20				
IIIA	ST	.60	.70	.70	.60				
	TT	.30	.40	.50	.40				
IIIB	ST	.60	.50	.60	.70				
	TT	.50	.40	.30	.50				
IV	ST	.60	.60	.40	.40	.40	.50		
	TT	.40	.40	.40	.40	.50	.40		
V	ST	.40	.30	.50	.40	.50	.50	.30	.40
	TT	.70	.30	.30	.50	.30	.40	.20	.50
VI	ST	.70	.60	.70	.60				
	TT	.40	.30	.40	.30				

Table IV-3: Item analysis (phi-coefficients) of the Creative Attitude Scale, primary level (N = 100)

Item	Ph	Pl	p	Ph-Pl	$\sqrt{pq}$	ø	.01	.05	add.
1	92	94	93	-2	.2551	-0.04			
2	84	74	79	10	.4073	0.122			x
3	52	26	39	26	.4877	.66	x		
4	60	36	48	4	.4996	.240		x	
5	86	70	78	16	.4142	.193		x	
6	84	64	74	20	.4386	.228		x	
7	78	58	68	20	.4665	.214		x	
8	64	58	61	6	.4877	.061			
9	98	76	87	22	.3363	.327	x		
10	42	22	32	20	.4665	.214		x	
11	88	76	82	12	.3842	.156			x
13	34	16	25	18	.4330	.208		x	
14	68	42	55	26	.4975	.261	x		
15	30	24	27	6	.4440	.068			
16	82	62	72	20	.4490	.223		x	
17	12	2	7	10	.2551	.196		x	
18	44	32	38	12	.4854	.124			x
19	88	72	80	16	.4000	.200		x	
20	16	6	11	10	.3129	.160			x
21	58	30	44	28	.4964	.282	x		
22	80	58	69	22	.4625	.238		x	
23	38	26	32	1	.4665	.129			x
25	70	64	67	6	.4702	.064			
26	62	56	59	6	.4918	.061			
27	66	60	63	6	.4828	.062			
28	84	80	82	4	.3842	.052			
29	24	8	16	16	.3666	.218		x	
30	56	34	45	22	.4975	.221		x	
31	84	74	79	10	.4073	.123			x
32	46	28	37	18	.4828	.186			x
33	50	24	37	26	.4828	.269	x		
34	62	34	48	28	.4996	.280	x		
35	60	48	54	12	.4984	.120			x
36	72	46	59	26	.4918	.264	x		
37	90	66	78	4	.4142	.289	x		
38	78	58	68	20	.4665	.214		x	
39	38	14	26	24	.4386	.274	x		
40	92	76	84	16	.3666	.218		x	

12 & 24 = distractors

Table IV-4: Item analysis (phi-coefficients) of the Creative Attitude Scale, junior secondary level (N = 100)

Item	Ph	Pl	p	Ph-Pl	$V\overline{pq}$	ø	.01	.05	add.
1	90	80	85	10	.3571	.140			x
2	94	86	90	8	.3000	.133			x
3	62	38	50	24	.5000	.240		x	
4	48	40	44	8	.4964	.080			
5	80	66	73	14	.4440	.158			x
6	86	62	74	24	.4386	.273	x		
7	64	50	57	14	.4951	.141			x
8	78	60	69	18	.4625	.195		x	
9	96	62	79	34	.4073	.417	x		
10	74	38	56	36	.4964	.363	x		
11	94	88	91	6	.2862	.105			
13	22	18	20	4	.4000	.050			
14	70	40	55	30	.4975	.301	x		
15	76	44	60	32	.4899	.327	x		
16	86	58	72	28	.4490	.312	x		
17	8	8	8	0	.2713	-			
18	58	32	45	26	.4975	.261	x		
19	96	76	86	20	.3470	.288	x		
20	20	10	15	10	.3571	.140			x
21	88	66	77	22	.4208	.261	x		
22	90	78	61	12	.4877	.123			x
23	44	42	33	2	.4702	.021			
25	86	60	73	26	.4440	.293	x		
26	90	68	79	22	.4073	.270	x		
27	70	60	65	10	.4770	.105			
28	94	64	79	30	.4073	.268	x		
29	46	22	34	24	.4737	.254	x		
30	84	74	79	10	.4073	.123			x
31	94	80	87	14	.3363	.208		x	
32	60	48	54	12	.4984	.120			x
33	36	24	30	12	.4583	.130			x
34	78	58	68	20	.4665	.214		x	
35	90	62	76	28	.4271	.328	x		
36	76	62	63	14	.4625	.151			x
37	98	78	88	20	.3250	.308	x		
38	82	56	69	26	.4625	.281	x		
39	56	18	36	38	.4800	.396	x		
40	90	82	86	8	.3470	.115			

12 & 24 = distractors

APPENDIX C

Tentative norm tables of the Creativity Battery

Based on the total score of the Creativity Battery the standard scores were computed for Primary and Junior Secondary levels separately, using the formula:

$$X_r = \frac{\sigma_r}{\sigma_w} (X_w - \overline{X}_w) + \overline{X}_r$$

where

X_r = raw score

$\overline{X}_r$ = mean raw score

σ_r = raw standard deviation

σ_w = weighted standard deviation

X_w = weighted score : 1 to 20

$\overline{X}_w$ = mean weighted score : 10

Table V-22 presents the standard scores based on the SD sample.

Table V-23 presents the standard scores based on the SMP sample.

Mean raw score for the SD group = 81.71; for the SMP group = 112.86

Standard Deviation " = 28.65; " = 32.78

$\frac{\sigma_r}{\sigma_w}$ for the SD sample = 9.55; for the SMP sample = 10.92.

Table V-22: Tentative Norm table of the Creativity Battery (total score) for Primary School, sixth grade

Weighted Score	Raw Score	Weighted Score	Raw Score
20	⩾ 177	10	82-90
19	168-176	9	72-81
18	158-167	8	63-71
17	149-157	7	53-62
16	139-148	6	44-52
15	129-138	5	34-43
14	120-128	4	24-33
13	110-119	3	15-23
12	101-109	2	5-14
11	91- 99	1	0- 4

Table V-23: Tentative Norm table of the Creativity Battery (total score) for Junior Secondary School, third grade

Weighted Score	Raw Score	Weighted Score	Raw Score
20	⩾ 222	10	113-123
19	211-221	9	102-112
18	200-210	8	91-101
17	189-199	7	80- 90
16	178-188	6	69- 79
15	167-177	5	58- 68
14	157-166	4	47- 57
13	146-156	3	36- 46
12	135-145	2	25- 35
11	124-134	1	15- 25

APPENDIX D

Table V-38: F - values on twenty-eight variables, for total SD and total SMP sample

	3SD's df(2,126)	3SMP's df(2,135)
1. Figure Exclusion	.27	.21
2. Word Relations	12.93	4.81
3. Remembering Numbers	4.18	7.21
4. Word Memory	12.06	2.53
5. Word Beginnings	17.95	10.32
6. Anagram	21.10	5.50
7. Three Word Sentences	9.67	7.12
8. Thing Categories	9.74	17.77
9. Unusual Uses	21.53	3.15
10. Consequences	30.31	16.25
11. Originality	9.10	1.65
12. Creative Attitude Scale	1.07	16.77
13. Bahasa Indonesia	23.14	22.16
14. Mathematics	17.33	27.35
15. Science	20.98	14.46
16. Social Science	20.09	30.02
17. English	-	27.45
18. Composition: Fluency	.50	23.86
19. Flexibility in sentence structure	4.41	2.90
20. Flexibility in content	2.32	11.84
21. Composition: Originality	4.68	21.66
22. Composition: Elaboration	1.94	5.93
23. Global rating	2.62	10.21
Composite score		
24. Convergent thinking tests	7.24	3.31
25. Short-term memory tests	14.24	3.45
26. Divergent thinking tests	29.67	11.99
27. School Achievement	31.06	42.92
28. Composition (analytic)	.40	24.85

For significancy at the .05 level an F-value of 3.07 is required for df(2,126) and df(2,135).

Significance of the difference between sample means

Table V-39: T- values calculated for twenty eight test variables

	SD1-SD2	SD1-SD3	SD2-SD3	SMP1-SMP2	SMP1-SMP3	SMP2-SMP3	SD-T-SMP-T
df	84	94	74	95	86	89	265
Variable							
1.	.71*	.40*	-.33*	.38*	.59*	.31*	5.08
2.	.74*	5.29	2.76	-.31*	2.48	2.96	14.68
3.	2.41	2.46	5.18	1.97	3.89	1.90*	-1.88
4.	1.36*	4.91	2.56	-1.56	-.28*	1.76*	2.67
5.	1.86*	5.96	3.86	.55*	4.23	4.27	7.89
6.	1.15*	6.59	4.29	1.84*	3.36	1.60*	7.39
7.	1.48*	4.55	2.36	.48*	3.61	3.48	7.51
8.	3.87	3.61	-.12*	-1.61*	4.69	6.29	3.48
9.	1.92*	6.75	4.42	-1.78*	.43*	2.75	4.18
10.	4.20	7.67	3.86	-1.42*	4.11	5.90	8.49
11.	3.16	3.84	.92*	-1.00*	.75*	2.03	3.55
12.	1.48*	.38*	-1.13*	-1.40*	4.32	5.12	8.13
13.	1.80*	6.82	3.93	-.75*	5.44	6.23	-
14.	3.56	5.82	1.59*	1.37*	7.98	5.51	-
15.	2.57	6.60	3.23*	-1.16*	4.27	5.48	-
16.	3.36	6.56	1.96	-.68*	6.47	7.63	-
17.	-	-	-	-1.08*	6.04	8.60	-
18.	-1.42*	.65*	.96*	1.77*	4.57	7.30	10.04
19.	-1.34*	-2.81	-1.55*	1.74*	.48*	2.36	-.71*
20.	1.23*	2.21	.65*	-2.26	2.42	6.17	3.16
21.	.81*	3.36	1.25*	-5.46	-.06*	5.34	5.16
22.	1.92*	-1.14*	.81*	-3.55	-1.39*	1.81*	5.02
23.	.27*	2.47	1.57*	-3.72	.06*	4.21	5.36
Composite score							
24.	1.55*	3.98	1.77*	-.05*	2.16	2.56	13.30
25.	2.62	5.21	2.27	-.18*	2.28	2.53	.73*
26.	3.35	7.57	4.63	-.09*	4.20	5.23	8.27
27.	3.39	8.36	3.33	-.70	8.28	9.08	-
28.	-.77*	-1.21*	.79*	-4.91	1.55*	7.54	7.42

* = not significant

APPENDIX E

DAFTAR CIRI-CIRI ANAK DIDIK

1. ingin mencari pengalaman-pengalaman baru/petualangan
2. penuh kasih sayang
3. bersifat mementingkan dan membantu orang lain
4. selalu mengajukan pertanyaan-pertanyaan
5. berusaha mengerjakan tugas-tugas yang sulit
6. mempunyai inisiatip (memulai sendiri sesuatu)
7. pandai menerka
8. pemalu
9. bersibuk terus menerus dengan tugasnya
10. memperhatikan/mempertimbangkan orang lain
11. kritis terhadap orang lain
12. berani dalam pendapat dan keyakinan
13. sopan
14. bersifat ingin tahu
15. suka bertanding/bersaing (kompetitif)
16. ingin menonjol/melebihi orang lain
17. tahu apa yang diinginkan
18. mau menguasai
19. menggganggu tata tertib kelas
20. melakukan tugas pada waktunya
21. mudah dikuasai oleh perasaan-perasaannya
22. peka/perasa
23. giat, bersemangat, penuh energi
24. mencari salah
25. angkuh dan puas dengan diri sendiri
26. sehat
27. bebas dalam pendapat
28. dalam berfikir
29. menurut firasat (intuitif)
30. rajin
31. senang bekerja sendiri

32. tidak pernah bosan
33. tidak mudah berselaras (non-konformis)
34. cenderung membantah/melawan
35. patuh
36. disenangi teman-teman
37. ulet
38. lebih menyukai tugas-tugas yang majemuk
39. fisik kuat
40. tenang
41. dapat menerima gagasan orang lain
42. bersifat tidak cepat membuka diri
43. mempunyai ingatan baik
44. percaya pada diri sendiri
45. dapat menyatakan dan mempertahankan diri
46. dapat mencukupi kebutuhan sendiri
47. mempunyai rasa humor
48. menghargai/mempunyai rasa keindahan
49. sungguh-sungguh
50. bersemangat dalam ketidaksesuaian pendapat
51. mengejar tujuan-tujuan jangka panjang
52. keras kepala
53. takut-takut, segan
54. tekun
55. senang berbicara
56. tidak mau menerima (pendapat) begitu saja
57. mempunyai minat luas
58. bersedia/berani mengambil risiko
59. cenderung menerima pendapat tokoh otoritas
60. penuh imaginasi

Table V-41: Means of characteristics in ideal pupil checklist by teachers, parents and psychologists

	Teachers			Parents			Psych.
Trait no.	SD	SMP	SD+SMP	SD	SMP	SD+SMP	
N	33	69	102	45	88	133	30
1.	2.51	2.70	2.64	2.64	2.54	2.52	1.9
2.	1.94	2.00	1.98	1.93	1.91	1.92	3.17
3.	2.36	2.07	2.17	2.4	2.41	2.41	3.13
4.	2.09	2.07	2.08	2.27	2.23	2.24	2.17
5.	2.03	1.98	2.00	2.33	2.09	2.17	2.4
6.	1.60	1.49	1.53	1.73	1.66	1.68	1.47
7.	2.79	2.52	2.61	2.62	2.83	2.76	2.83
8.	3.97	4.00	3.99	3.69	3.79	3.76	3.57
9.	3.12	2.85	2.94	3.22	2.94	3.04	2.87
10.	2.27	2.64	2.12	2.46	2.49	2.48	2.87
11.	2.76	2.54	2.61	2.73	2.87	2.83	2.5
12.	1.97	1.71	1.79	1.84	1.75	1.78	2.03
13.	1.82	1.56	1.65	1.55	1.70	1.65	3.17
14.	2.24	2.16	2.19	2.46	2.60	2.56	1.77
15.	2.61	2.33	2.42	2.82	2.77	2.64	2.73
16.	3.24	3.25	3.24	3.26	3.44	3.38	3.03
17.	2.39	2.19	2.25	2.44	2.33	2.37	2.3
18.	3.48	3.58	3.55	3.53	3.65	3.61	3.43
19.	3.94	4.00	3.98	3.82	3.92	3.89	3.5
20.	1.82	1.75	1.77	1.95	1.79	1.85	2.8
21.	3.67	3.70	3.69	3.47	3.60	3.56	3.13
22.	4.85	3.00	2.95	3.00	3.43	3.29	2.87
23.	1.54	1.35	1.41	1.64	1.72	1.73	1.97
24.	3.76	3.84	3.81	3.42	3.77	3.74	3.23
25.	3.85	3.88	3.87	3.60	3.91	3.80	3.70
26.	1.94	1.71	1.78	1.80	1.79	1.80	3.03
27.	2.33	1.97	2.09	2.35	2.23	2.27	2.13
28.	2.18	1.94	2.01	2.20	2.02	2.08	1.73
29.	3.33	3.19	3.23	2.98	2.90	2.92	2.63
30.	1.54	1.71	1.66	1.58	1.59	1.59	2.63

Trait no.	Teachers			Parents			Psych.
	SD	SMP	SD+SMP	SD	SMP	SD+SMP	
N	33	69	102	45	88	133	30
31.	2.18	2.12	2.14	2.23	2.24	2.23	2.7
32.	1.91	1.93	1.92	2.15	2.17	2.16	2.2
33.	3.30	3.83	3.67	3.11	3.10	3.10	2.9
34.	3.94	3.80	3.90	3.62	3.84	3.77	3.47
35.	1.88	1.90	2.09	1.89	1.83	1.85	3.43
36.	2.00	2.03	2.02	2.13	2.03	2.07	3.00
37.	1.91	1.81	1.84	2.18	1.75	1.89	2.23
38.	2.64	2.75	2.72	2.95	2.93	2.94	2.63
39.	2.06	2.00	2.02	2.20	1.98	2.06	3.03
40.	1.97	2.04	2.02	2.13	2.03	2.07	2.93
41.	2.12	2.00	2.03	2.27	2.29	2.28	2.4
42.	2.91	2.87	2.88	2.98	2.85	2.89	3.33
43.	1.97	1.77	1.83	2.00	1.95	1.97	2.30
44.	1.58	1.67	1.62	1.69	1.58	1.62	1.97
45.	2.27	2.01	2.10	2.13	2.06	2.08	2.20
46.	2.27	2.04	2.14	2.33	2.19	2.24	2.87
47.	2.15	2.09	2.11	2.13	2.16	2.15	2.70
48.	1.94	1.96	1.95	2.11	2.07	2.08	2.50
49.	1.97	1.91	1.93	2.07	1.86	1.93	2.47
50.	3.12	3.45	3.34	3.04	3.02	3.03	2.67
51.	2.21	2.26	2.24	2.38	2.20	2.26	2.67
52.	3.91	3.97	3.95	3.73	3.92	3.86	3.67
53.	3.79	3.96	3.90	3.53	3.92	3.79	3.90
54.	1.88	1.85	1.86	1.93	1.91	2.92	2.53
55.	2.70	2.91	2.84	2.69	2.79	2.76	3.1
56.	2.09	2.00	2.03	2.08	2.20	2.24	2.27
57.	1.79	2.01	1.94	2.24	2.11	2.16	1.7
58.	2.48	1.98	2.15	2.35	2.12	2.20	2.00
59.	3.00	3.26	3.18	3.07	3.32	3.23	3.67
60.	2.42	2.27	2.32	2.62	2.45	2.51	1.30

Table V-42: Ranking of characteristics in ideal pupil checklist by experts, teachers and parents

Trait	Q-sort	Psych.	Teach.	Parents
1. Adventurous	4	6	41	35
2. Affectionate	45	48.5	16	10
3. Altruistic	42	46.5	33	32
4. Always asking questions	19	12	24	26
5. Attempts difficult tasks	18	19.5	17	22
6. A self-starter	5	2	2	4
7. A good guesser	26.5	34	39.5	38.5
8. Bashful	57	56	57	60
9. Becomes preoccupied with tasks	40	36.5	45	46
10. Considerate of others	37.5	36.5	29	33
11. Critical of others	16	22.5	39.5	40
12. Courageous in convictions	13	10	8	6
13. Courteous	50	48.5	4	3
14. Curious	3	5	34	36
15. Competitive	35	32	38	37
16. Desires to excel	44	43	49	50
17. Determinated	23.5	17.5	36	31
18. Domineering	52	52.5	51	52
19. Disturbs class organizations and procedures	54.5	55	59	60
20. Does work on time	33.5	33	6	58
21. Emotional	47.5	46.5	53	51
22. Emotionally sensitive	33.5	36.5	46	49
23. Energetic	20	7.5	1	5
24. Fault-finding	57	50	54	53
25. Haughty and self-satisfied	57	59	55	57
26. Health	37.5	43	7	7
27. Independent in judgment	6.5	11	25.5	29
28. Independent in thinking	1	4	18	17
29. Intuitive	11.5	26	48	42.5
30. Industrious	43	26	5	1
31. Likes to work alone	31	30.5	30.5	24

Trait	Q-sort	Psych.	Teach.	Parents
32. Never Bored	10	13.5	12	20.5
33. Non-conforming	16	39	52	47
34. Negativistic	53	54	56.5	55
35. Obedient	54.5	52.5	25.5	8
36. Popular, well-liked by pears	41	41	20	14.5
37. Persistent	21	15	9	11
38. Prefers complex tasks	14	26	42	44
39. Physically strong	47.5	43	20	13
40. Quiet	37.5	40	20	14.5
41. Receptive to ideas of others	28.5	19.5	22.5	30
42. Reserved	49	51	44	41
43. Remembers well	23.5	17.5	9	12
44. Self-confident	8	7.5	3	2
45. Self-assertive	16	13.5	27	17
46. Self-sufficient	37.5	36.5	30.5	26
47. Sense of humor	23.5	30.5	28	19
48. Sense of beauty	26.5	22.5	15	17
49. Sincere	28.5	21	13	11
50. Spirited in disagreement	31	28.5	50	45
51. Strives for distant goals	23.5	28.5	35	28
52. Stubborn	51	57.5	58	59
53. Timid	59	60	56.5	56
54. Thorough	31	24	11	42.5
55. Talkative	46	45	43	38.5
56. Unwilling to accept say-so	9	16	22.5	26
57. Has broad interests	6.5	3	14	20.5
58. Willing to take risks	11.5	9	32	23
59. Willing to accept judgments of others others	60	57.5	47	48
60. Imaginative	2	1	37	34

Q-sort = sample of psychologists, using the Q-sort technique in rating (N = 10)
Psych. = sample of psychologists (N = 30)
Teach. = sample of teachers, (N = 102), consisting of 33 elementary teachers and 69 junior secondary teachers
Parents = sample of parents (N = 133), 45 parents of elementary pupils and 88 parents of junior secondary pupils

Table V-43: Ranking of characteristics in ideal pupil checklist by teachers (N = 102)

1. Energetic
2. A self-starter
3. Self-confident
4. Courteous
5. Industrious
6. Does work on time
7. Healthy
8. Courageous in convictions
9. Remembers well
10. Persistent
11. Thorough
12. Never bored
13. Sincere
14. Has borad interests
15. Sense of beauty
16.5 Affectionate
16.5 Physically strong
18. Attempts difficult tasks
19. Independent in thinking
20.5 Popular, well-liked by peers
22.5 Receptive to ideas of others
24. Always asking questions
25.5 Independent in judgment
25.5 Obedient
27. Self-assertive
28. Sense of humor
29. Considerate of others
30.5 Likes to work alone
30.5 Self-sufficient
32. Willing to take risks
33. Altruistic
34. Curious
35. Strives for distant goals

36. Determinated
37. Imaginative
38. Competitive
39.5 A good guesser
39.5 Critical of others
41. Adventurous
42. Prefers complex tasks
43. Talkative
44. Reserved
45. Becomes preoccupied with tasks
46. Emotionally sensitive
47. Willing to accept judgments of authorities
48. Intuitive
49. Desires to excel
50. Spirited in disagreement
51. Domineering
52. Non-conforming
53. Emotional
54. Fault-finding
55. Haughty and self-satisfied
56.5 Negativistic
56.5 Timid
58. Stubborn
59. Disturbs class organization and procedures
60. Bashful

Table V-44: Ranking of characteristics on the ideal pupil by parents (N = 133)

1.	Industrious
2.	Self-confident
3.	Courteous
4.	A self-starter
5.	Energetic
6.	Courageous in convictions
7.	Healthy
8.	Obedient
9.	Persistent
10.	Sincere
11.	Remembers well
12.	Physically strong
14.	Affectionate
14.	Popular, well-liked by peers
14.	Quiet
17.	Independent in thinking
17.	Self-assertive
17.	Sense of beauty
19.	Sense of humor
20.5	Has broad interests
20.5	Never bored
22.	Attempts difficult tasks
23.	Willing to take risks
24.	Likes to work alone
26.	Self-sufficient
26.	Unwilling to accept say-so
28.	Strives for distant goals
29.	Independent in judgment
30.	Receptive to ideas of others
31.	Determinated
32.	Altruistic
33.	Considerate of others
34.	Imaginative

35. Adventurous
36. Curious
37. Competitive
38.5 A good guesser
39. Talkative
40. Critical of others
41. Reserved
42.5 Intuitive
42.5 Thorough
44. Prefers complex tasks
45. Spirited in disagreement
46. Becomes preoccupied with tasks
47. Non-conforming
48. Willing to accept judgments by authorities
49. Emotionally sensitive
50. Desires to excel
51. Emotional
52. Domineering
53. Faultfinding
54. Bashful
55. Negativistic
56. Timid
57. Haughty and self-satisfied
58. Does work on time
59. Stubborn
60. Disturbs class organization and procedures

Table V-45: Ranking of characteristics of the creative personality by psychologists (N = 30)

1.	Imaginative
2.	A self-starter
3.	Has broad interests
4.	Independent in thinking
5.	Curious
6.	Adventurous
7.5	Energetic
7.5	Self-confident
9.	Willing to take risks
10.	Courageous in convictions
11.	Independent in judgment
12.	Always asking questions
13.5	Self-assertive
15.5	Never bored
15.	Persistent
16.	Willing to accept judgments of authorities
17.5	Determinated
17.5	Remembers well
19.5	Attempts difficult tasks
19.5	Receptive to ideas of others
21.	Sincere
22.5	Critical of others
22.5	Sense of beauty
24.	Thorough
26.	Instuitive
26.	Industrious
26.	Prefers complex tasks
28.5	Spirited in disagreement
28.5	Strives for distant goals
30.5	Likes to work alone
30.5	Sense of humor
32.	Competitive
33.	Does work on time

34. A good guesser
36.5 Becomes preoccupied with tasks
26.5 Considerate of others
36.5 Emotionally sensitive
36.5 Self-sufficient
39. Non-conforming
40. Quiet
41. Popular, well-liked by peers
43. Desires to excel
43. Healthy
43. Physically strong
45. Talkative
46.5 Altruistic
46.5 Emotional
48.5 Affectionate
48.5 Courteous
50. Fault finding
51. Reserved
52.5 Domineering
52.5 Obedient
54. Negativistic
55. Disturbs class organisation and procedures
56. Bashful
57.5 Stubborn
59. Haughty and self-satisfied
60. Timid

APPENDIX F

Table V-47: Means and Standard Deviations of Total Test Scores, calculated for male and female students from a) primary schools and b) junior secondary schools (SMP)

a. SD	Total score		male	female
		N	70	59
		%	54	46
	1. Intelligence	Mean	30.6	28.96
		S.D.	9.05	6.72
	2. Rote Memory	Mean	19.52	19.28
		S.D.	5.14	5.41
	3. Creativity	Mean	82.94	80.23
		S.D.	31.15	25.56
	4. School-Achievement	Mean	172.25	171.15
		S.D.	27.65	22.96
	5. Composition	Mean	6.48	6.18
		S.D.	2.48	2.68

b. SMP	Total Score		male	female
		N	70	68
		%	51	49
	1. Intelligence	Mean	43.25	42.51
		S.D.	7.97	7.87
	2. Rote Memory	Mean	19.65	20.07
		S.D.	4.91	4.24
	3. Creativity	Mean	113.8	111.88
		S.D.	32.18	33.59
	4. School-Achievement	Mean	228.62	219.63
		S.D.	39.27	41.19
	5. Composition	Mean	9.08	8.70
		S.D.	3.34	2.67

Tabel V-48: Total Test Scores related to age levels, at the Primary School, 6th grade, and at the Junior Secondary School, 3rd grade

SD	Total score	Age	11 yrs	12 yrs	13 yrs	14 yrs	15 yrs
		N	16	60	31	13	9
		%	12%	47%	24%	10%	7%
	1. Intelligence	Mean	35.62	31.68	27.38	24.61	23.44
		S.D.	9.41	7.10	5.78	9.57	6.16
	2. Rote Memory	Mean	20.25	20.86	18.25	16.61	16.33
		S.D.	4.12	4.62	5.45	5.90	6.44
	3. Creativity	Mean	98.12	89.36	74.22	60	58.55
		S.D.	34.50	29.02	17.28	21.71	17.35
	4. School Achie-vement	Mean	186.75	180.61	164.45	147.84	145.66
		S.D.	20.01	23.00	22.13	22.60	15.12
	5. Composition	Mean	6.75	6.4	6.09	5.84	6.88
		S.D.	2.84	2.95	1.64	1.86	3.14

SMP	Total score	Age	14 yrs	15 yrs	16 yrs	17 yrs	18 yrs
		N	15	57	52	10	3
		%	11%	42%	38%	7%	2%
	1. Intelligence	Mean	44.93	44.73	41.69	36.7	40.33
		S.D.	6.02	7.67	7.91	8.08	10.69
	2. Rote Memory	Mean	22.06	19.84	20.07	17	16.66
		S.D.	4.97	4.01	4.81	4.87	3.21
	3. Creativity	Mean	111.8	119.68	111.5	90.9	94.33
		S.D.	30.25	33.34	30.63	37.69	32.31
	4. School-Achie-vement	Mean	241	227.94	222.82	193.3	205
		S.D.	37.25	43.04	36.59	39.01	24
	5. Composition	Mean	9.26	9.54	8.86	6.6	4.6
		S.D.	3.21	2.73	2.97	2.95	2.08

Table V-50: Means and Standard Deviations of Total Test Score, related to number of children in the family, calculated for students from Primary School (SD) and Junior Secondary School (SMP)

SD	Total Score	Number of children	1	2-3	4-6	7-10	more than 10
		N	5	37	57	27	1
			4%	29%	45%	21%	1%
1.	Intelligence	Mean	39	29	30.56	28.18	27
		S.D.	6.20	7.52	8.22	8.14	0
2.	Rote Memory	Mean	19.2	19.43	20.54	17.40	24
		S.D.	6.30	5.16	4.68	5.79	0
3.	Creativity	Mean	89	81.13	87.63	70.25	58
		S.D.	12.42	19.80	33.83	27.46	0
4.	School-Achievement	Mean	195.8	172.56	173.98	162.62	179
		S.D.	12.79	22.28	27.21	25.68	0
5.	Composition	Mean	5.4	6.56	6.50	5.88	9
		S.D.	1.31	2.21	2.99	2.17	0

SMP	Total Score	Number of children	1	2-3	4-6	7-10	more than 10
		N	6	19	47	38	16
		%	5%	15%	37%	30%	13%
1.	Intelligence	Mean	45.66	45.10	42.48	44.15	39.62
		S.D.	7.55	7.19	7.59	8.09	8.64
2.	Rote Memory	Mean	22.33	18.84	20.72	19.65	18.5
		S.D.	3.07	5.06	4.06	3.93	6.60
3.	Creativity	Mean	123.83	109.68	114.21	113.60	112.62
		S.D.	29.64	24.84	38.82	33.97	27.10
4.	School-Achievement	Mean	288.66	232.68	221.14	226.21	215.18
		S.D.	32.46	34.03	42.34	43.60	34.98
5.	Composition	Mean	7.66	8.78	8.70	8.55	9.75
		S.D.	2.65	3.24	3.04	3.35	2.48

Table V-51: Means and Standard Deviations of Total Test Scores, of groups taking private lessons and groups who do not, calculated for students from Primary School and Junior Secondary School.

SD (N = 128)		private lessons	no private lessons
	N	77	51
	%	60	40
1. Intelligence	Mean	29.92	29.94
	S.D.	7.41	9.04
2. Rote Memory	Mean	20.03	18.58
	S.D.	5.49	4.77
3. Creativity	Mean	79.68	84.84
	S.D.	30.24	26.37
4. School-Ach.	Mean	172.40	171.0
	S.D.	26.92	23.64
5. Composition	Mean	6.40	6.33
	S.D.	2.69	2.38

SMP (N = 137)		private lessons	no private lessons
	N	22	115
	%	16	[illegible]
1. Intelligence	Mean	42.[illegible]	[illegible]
	S.D.	7.83	7.98
2. Rote Memory	Mean	21.09	[illegible]
	S.D.	5.67	[illegible]
3. Creativity	Mean	[illegible]	111.46
	S.D.	36.58	32.13
4. School Achie-verent	Mean	228.[illegible]	223.63
	S.D.	41.77	[illegible]
5. Composition	Mean	9.66	8.66
	S.D.	2.55	3.05

Table V-52: Means and Standard Deviations of Total Test Scores, related to educational level of the father, calculated for students from Primary School (SD) and Junior Secondary School (SMP)

SD (N = 92)		1	2	3	4	5	6
	N	9	8	45	14	15	1
	%	10	.9	49	15	16	1
1. Intelligence	Mean	36.55	34.12	31.97	27.07	28.33	21
	S.D.	7.66	11.34	8.16	8.76	4.90	0
2. Rote Memory	Mean	21.22	21.75	21.37	17.57	17.2	17
	S.D.	3.73	4.26	4.54	6.00	5.44	0
3. Creativity	Mean	101	104.5	90.42	82.42	76.06	63
	S.D.	35.34	42.15	26.57	16.34	16.81	0
4. School-Ach.	Mean	187.66	192.12	182.02	176.85	163.86	133
	S.D.	20.95	24.25	22.89	26.34	21.15	0
5. Composition	Mean	8	8	6.06	5.64	6.53	9
	S.D.	3.6	3.54	2.54	2.37	1.99	0

SMP (N = 133)		1	2	3	4	5	6
	N	13	14	56	23	25	2
	%	10	11	42	17	19	2
1. Intelligence	Mean	43.30	44.42	43.66	42.52	40.04	42
	S.D.	8.19	8.23	7.16	8.20	8.75	7.07
2. Rote Memory	Mean	19.69	19.35	20	19.91	19.68	21.5
	S.D.	3.40	5.21	5.21	4.72	3.70	.70
3. Creativity	Mean	118.92	126.42	111.08	112.65	104.44	142.5
	S.D.	41.85	29.46	30.08	35.00	30.36	28.99
4. School-Ach.	Mean	239.76	248.09	223.23	216.86	207.4	253
	S.D.	43.90	37.97	39.44	42.60	33.79	12.72
5. Composition	Mean	10.69	10.5	8.67	9	7.68	8.5
	S.D.	2.81	2.50	2.89	2.92	3.33	2.12

1 = Master Degree (Sarjana)
2 = Bachelor Degree (Sarjana Muda)
3 = Senior High (S.L.T.A.)
4 = Junior High (S.L.T.P.)
5 = Elementary (S.D.)
6 = less than " (tidak tamat SD)

Table V-54: Means and Standard Deviations of Total Test Scores, related to educational level of the mother, calculated for students from Primary School (SD) and Junior Secondary School (SMP)

SD (N = 93)		1	2	3	4	5	6
	N	1	4	38	24	17	9
	%	1	4	41	26	18	10
1. Intelligence	Mean	36	29.5	33.52	31.37	29	27.22
	S.D.	0	10.9	7.44	9.22	6.18	10.34
2. Rote Memory	Mean	19	21.25	21.23	20.95	20	17.44
	S.D.	0	4.11	4.78	4.11	4.80	5.38
3. Creativity	Mean	114	84.25	100.34	86.66	76	77.55
	S.D.	0	41.70	29.04	27.61	18.61	17.20
4. School-Achievement	Mean	206	174	188.28	178.75	171.23	160.77
	S.D.	0	34.86	19.66	21.66	20.84	34.39
5. Composition	Mean	9	5.75	6.86	6.54	5	7.11
	S.D.	0	3.59	2.60	3.38	2.03	1.90

SMP (N = 128)		1	2	3	4	5	6
	N	1	3	44	29	46	5
	%	.8	2	34	23	36	4
1. Intelligence	Mean	44	43	44.93	41	42.08	39.2
	S.D.	0	12.48	7.02	7.65	7.90	8.28
2. Rote Memory	Mean	21	14.33	20.93	19	19.95	18.8
	S.D.	0	4.16	4.64	4.86	3.85	3.56
3. Creativity	Mean	120	127.33	125.43	104.06	107.93	96
	S.D.	0	24.98	33.17	32.10	29.86	15.89
4. School-Achievement	Mean	218	227.33	239.40	215.37	215.82	229.8
	S.D.	0	17.61	41.96	42.38	38.04	19.44
5. Composition	Mean	8	10	9.90	8.51	8.52	10
	S.D.	0	1	2.76	3.12	3.07	2.82

1 = Master degree (Sarjana)
2 = Bachelor degree (Sarjana Muda)
3 = Senior High (S.L.T.A.)
4 = Junior High (S.L.T.P.)
5 = Elementary (S.D.)
6 = less than Elementary (tidak tamat SD)

Table V-56: Means and Standard Deviations of Total Test Scores, related to language usage at home, calculated for students from Primary School and Junior Secondary School

SD (N = 124)		Beh. Indonesia	local language
	N	103	21
	%	83	17
1. Intelligence	Mean	30.40	28.09
	S.D.	8.33	7.57
2. Rote Memory	Mean	19.59	18.28
	S.D.	5.32	4.75
3. Creativity	Mean	82.46	83.04
	S.D.	29.26	28.34
4. School Achie-vement	Mean	173.69	165.38
	S.D.	26.05	21.55
5. Composition	Mean	6.23	6.76
	S.D.	2.49	2.82

SMP (N = 132)		Beh. Indonesia	Local	mixed
	N	110	12	10
	%	83	9	8
1. Intelligence	Mean	43.31	42.66	40.3
	S.D.	7.79	7.59	7.98
2. Rote Memory	Mean	19.8	18.75	20.2
	S.D.	4.35	5.22	3.70
3. Creativity	Mean	114.65	114.75	104.7
	S.D.	34.79	20.42	31.68
4. School-Achie-vement	Mean	224.4	231.75	214.8
	S.D.	41.56	23.81	44.76
5. Composition	Mean	8.79	9.16	9.8
	S.D.	3.08	3.76	2.14

Table V-57: Means and Standard Deviations of Total Test Scores, by amount of time spent in doing homework, calculated for students from Primary School and Junior Secondary School

SD (N = 126)		More than 2 hrs	1 - 2 hrs	.5-1 hrs	less than .5 hr
	N	17	66	38	5
	%	14	52	30	4
1. Intelligence	Mean	27.76	31.25	29.78	24.2
	S.D.	7.72	8.27	6.89	9.60
2. Rote Memory	Mean	19	20.15	18.21	16.6
	S.D.	6.45	5.28	4.47	3.57
3. Creativity	Mean	86.52	87.48	76.81	45.2
	S.D.	23.97	31.76	22.17	12.49
4. School Achievement	Mean	166.82	177.75	169.68	145
	S.D.	29.73	24.52	21.37	8.12
5. Composition	Mean	6.29	6.57	6.18	4.6
	S.D.	2.28	2.61	2.62	1.51

SMP (N = 130)		More than 3 hrs	2 - 3 hrs	1-2 hrs	less than 1 hr
	N	2	20	84	24
	%	2	15	65	18
1. Intelligence	Mean	44.5	42.2	43.19	43.54
	S.D.	9.19	8.16	7.83	7.22
2. Rote Memory	Mean	18	19.35	20.10	18.95
	S.D.	4.24	4.08	4.52	3.90
3. Creativity	Mean	110	123.85	112.30	107.75
	S.D.	5.65	41.08	31.69	27.80;
4. School Achievement	Mean	219	224.75	229.71	205.20
	S.D.	32.64	39.63	46.38	69.29
5. Composition	Mean	9.5	9.8	8.8	8.66
	S.D.	3.53	2.87	3.22	2.77

Table V-58: Means and Standard Deviations of Total Test Scores, related to place to study, calculated for students from Primary Schools and Junior Secondary Schools

SD (N = 128)		good	eppropriate	not good
	N	22	104	2
	%	17	81	2
1. Intelligence	Mean	28.77	30.12	33
	S.D.	8.48	8.11	11.31
2. Rote Memory	Mean	19.27	19.30	19.5
	S.D.	5.97	5.11	3.53
3. Creativity	Mean	84.31	81.19	105.5
	S.D.	36.43	27.04	14.84
4. School-Achie-vement	Mean	170.45	171.94	192
	S.D.	26.21	25.12	11.31
5. Composition	Mean	5.68	6.43	6
	S.D.	2.31	2.59	2.82

SMP (N = 134)		private	with others	friend's home
	N	58	70	6
	%	43	52	5
1. Intelligence	Mean	42.51	43.37	41.66
	S.D.	7.84	7.93	7.25
2. Rote Memory	Mean	19.81	19.7	18.33
	S.D.	4.47	4.25	4.76
3. Creativity	Mean	110.72	115.32	111.5
	S.D.	31.08	34.92	30.11
4. School-Achie-vement	Mean	218.46	229.45	216.66
	S.D.	39.63	41.39	31.80
5. Composition	Mean	8.96	9.1	7.33
	S.D.	2.90	3.17	3.50

Table V-59: Means and Standard Deviations of Total Test Scores related to parents asking about homework, calculated for students from Primary School and Junior Secondary School.

SD (N = 128)		always	occasionally	never
	N	67	56	5
	%	52	44	4
1. Intelligence	Mean	30.76	29.44	24.4
	S.D.	8.08	8.41	3.28
2. Rote Memory	Mean	19.80	18.71	19.20
	S.D.	5.66	4.72	4.26
3. Creativity	Mean	85.29	79.12	72.8
	S.D.	30.64	26.95	16.76
4. School-Achievement	Mean	175.26	169.62	154.8
	S.D.	25.60	24.50	20.27
5. Composition	Mean	6.17	6.37	7
	S.D.	2.43	2.69	2.91

SMP (N = 136)		always	occasionally	never
	N	27	76	33
	%	20	56	24
1. Intelligence	Mean	40	43.73	43.81
	S.D.	7.86	7.80	7.40
2. Rote Memory	Mean	20.29	18.85	21.45
	S.D.	3.94	4.65	3.19
3. Creativity	Mean	100.07	112.26	127.63
	S.D.	27.83	32.20	35.04
4. School-Achievement	Mean	216.22	221.98	236.60
	S.D.	34.21	41.01	40.48
5. Composition	Mean	9	8.55	9.84
	S.D.	2.51	3.03	3.30

Table V-60: Means and Standard Deviations of Total Test Scores related to parents assisting in homework, calculated for students of Primary Schools and Junior Secondary Schools

SD (N = 128)		always	occasionally	never
	N	16	98	14
	%	13	76	11
1. Intelligence	Mean	28.93	30.51	27.07
	S.D.	9.16	8.05	7.56
2. Rote Memory	Mean	18.31	19.82	16.78
	S.D.	6.95	4.94	4.22
3. Creativity	Mean	77.93	84.60	69.42
	S.D.	25.51	29.95	19.08
4. School-Achievement	Mean	170.25	174.70	155.07
	S.D.	24.86	25.47	16.24
5. Composition	Mean	5.37	6.47	6.07
	S.D.	1.82	2.64	2.52

SMP (N = 137)		always	occasionally	never
	N	11	81	45
	%	8	59	33
1. Intelligence	Mean	45.90	42.24	43.33
	S.D.	7.28	7.62	8.05
2. Rote Memory	Mean	21.90	19.54	19.37
	S.D.	3.41	4.46	4.12
3. Creativity	Mean	104.90	115.22	110.51
	S.D.	33.73	32.41	33.91
4. School-Achievement	Mean	221.63	225.90	221.37
	S.D.	33.68	36.05	43.54
5. Composition	Mean	9.27	8.62	9.37
	S.D.	2.86	2.99	3.20

Table V-61: Means and Standard Deviations of Total Test Scores related to number of books at home, calculated for students from Primary School and Junior Secondary School

SD (N = 123)		no books	1-10 books	11-20 books	more than 20
	N	2	42	25	54
	%	2	34	20	44
1. Intelligence	Mean	23	26.83	33.28	31.20
	S.D.	7.07	8.13	8.76	7.11
2. Rote Memory	Mean	17	18.45	20.24	19.81
	S.D.	8.48	5.58	4.37	5.29
3. Creativity	Mean	51.5	74.57	99.48	81.79
	S.D.	20.50	25.16	36.13	25.28
4. School-Achie-vement	Mean	151.5	164.07	184.64	174.94
	S.D.	17.67	25.32	26.10	22.83
5. Composition	Mean	3.5	6.38	6.36	6.18
	S.D.	2.12	2.77	2.58	2.35

SMP (N = 132)		no books	1-10 books	11-20 books	more than 20
	N	0	2	21	109
	%	0	1.5	16	82.5
1. Intelligence	Mean	-	42	39.71	43.70
	S.D.	-	7.07	6.79	7.86
2. Rote Memory	Mean	-	20.5	19.28	19.72
	S.D.	-	2.12	5.03	4.22
3. Creativity	Mean	-	99.5	100.66	116.64
	S.D.	-	31.81	38.46	31.06
4. School-Achie-vement	Mean	-	266.45	157.78	157.40
	S.D.	-	51.61	39.72	39.67
5. Composition	Mean	-	9	8.80	8.93
	S.D.	-	2.82	3.80	2.88

Table V-62: Means and Standard Deviations of Total Test Scores, related to newspaper subscription, calculated for students from Primary and Junior Secondary Schools

SD (N = 128)		yes	no
	N	97	31
	%	75	25
1. Intelligence	Mean	30.53	28.06
	S.D.	8.25	7.70
2. Rote Memory	Mean	19.68	18.12
	S.D.	4.95	5.89
3. Creativity	Mean	85.60	71.16
	S.D.	29.99	21.14
4. School-Achievement	Mean	175.82	160.03
	S.D.	24.76	22.89
5. Composition	Mean	6.28	6.32
	S.D.	2.65	2.24

SMP (N = 138)		subscription	often	occasionally	never
	N	87	31	16	4
	%	63	22	12	3
1. Intelligence	Mean	42.96	43.03	43.75	39.25
	S.D.	7.77	7.78	8.85	2.06
2. Rote Memory	Mean	19.08	20.64	21.12	20.75
	S.D.	4.57	3.09	4.5	4.64
3. Creativity	Mean	115.24	113.19	106.37	96.75
	S.D.	35.24	29.42	31.04	13.69
4. School-Achievement	Mean	228.62	224.96	209.25	192.5
	S.D.	42.08	36.92	32.20	17.71
5. Composition	Mean	9.26	8.54	7.87	8.75
	S.D.	3.08	2.96	2.82	3.30

Table V-63: Means and Standard Deviations of Total Test Scores, related to television at home, calculated for students from Primary and Junior Secondary Schools

SD (N = 128)		yes	no
	N	104	24
	%	81	19
1. Intelligence	Mean	30.69	26.66
	S.D.	8.18	7.37
2. Rote Memory	Mean	19.77	17.25
	S.D.	5.08	5.40
3. Creativity	Mean	86.33	63.79
	S.D.	29.12	17.93
4. School-Achievement	Mean	174.60	160.70
	S.D.	24.94	23.38
5. Composition	Mean	6.48	5.5
	S.D.	2.61	2.12

SMP (N = 137)		yes	no
	N	121	16
	%	88	12
1. Intelligence	Mean	42.90	43.12
	S.D.	8.00	6.15
2. Rote Memory	Mean	19.66	20.43
	S.D.	4.32	4.25
3. Creativity	Mean	114.20	107.62
	S.D.	34.11	24.24
4. School Achievement	Mean	225.28	220.12
	S.D.	41.20	30.83
5. Composition	Mean	9.07	8.18
	S.D.	3.04	2.68

Table V-64: Means and Standard Deviations of Total Test Scores related to leisure time activities, calculated for students of Primary and Junior Secondary Schools

SD (N = 106)		1	2	3	4	5
	N	18	17	8	56	7
	%	17	16	7	53	7
1. Intelligence	Mean	33.88	25.64	27.25	30.44	28.28
	S.D.	7.15	5.90	5.33	8.18	3.90
2. Rote Memory	Mean	17.61	18.41	16.37	20.41	21.71
	S.D.	4.44	5.36	3.42	5.41	4.60
3. Creativity	Mean	88.72	69	64.87	87.08	85.85
	S.D.	17.36	22.22	20.88	33.06	24.47
4. School Achie-	Mean	181.22	163	166.87	174.30	164.28
vement	S.D.	19.83	19.33	15.86	26.55	13.13
5. Composition	Mean	6.77	5.05	6.87	6.55	5.28
	S.D.	2.75	2.13	1.72	2.69	2.56

SMP (N = 131)		1	2	3	4	5
	N	20	20	2	21	64
	%	15	15	2	16	49
1. Intelligence	Mean	42.1	43.2	42	45.85	42.53
	S.D.	7.86	9.08	15.55	7.74	7.07
2. Rote Memory	Mean	19.1	20	18	19.76	20
	S.D.	3.94	4.42	11.31	5.32	3.97
3. Creativity	Mean	117.5	115.1	135	131.85	105.26
	S.D.	26.25	36.38	67.88	40.93	29.31
4. School-Achie-	Mean	216.85	225.9	237.5	248.76	217.70
vement	S.D.	29.69	48.80	94.04	38.89	36.37
5. Composition	Mean	9.15	8.95	8	10.57	8.59
	S.D.	2.73	2.89	2.82	2.73	3.21

1 = talking and playing
2 = listening to the radio
3 = reading the Qur'an
4 = reading other things
5 = watching television (SD)
5 = helping parents (SMP)

Table V-65: Means and Standard Deviations of Total Test Scores related to correction of speech by parents, calculated for students of Primary and Junior Secondary Schools

SD (N = 126)		1	2	3
	N	47	75	4
	%	37	60	3
1. Intelligence	Mean	29.80	30.14	28
	S.D.	8.75	7.75	11.48
2. Rote Memory	Mean	18.48	19.90	16.25
	S.D.	5.34	5.18	2.21
3. Creativity	Mean	76.51	85.16	87
	S.D.	32.84	26.26	23.32
4. School-Achie-vement	Mean	167.59	174.73	176.75
	S.D.	22.96	26.28	33.29
5. Composition	Mean	5.78	6.42	9.25
	S.D.	2.44	2.57	1.25

SMP (N = 135)		1	2	3
	N	48	82	5
	%	36	60	4
1. Intelligence	Mean	41.20	43.73	47.2
	S.D.	7.05	8.12	6.76
2. Rote Memory	Mean	19.33	19.86	23.6
	S.D.	4.11	4.40	2.07
3. Creativity	Mean	103.91	116.28	153.8
	S.D.	27.46	32.55	58.20
4. School Achie-vement	Mean	211.85	228.47	269.2
	S.D.	37.81	38.08	57.09
5. Composition	Mean	8.64	9	10.8
	S.D.	3.31	2.81	4.08

1 = parents forcing to speak correctly

2 = parents occasionally correcting speech

3 = parents leaving the child free in speaking

Table V-66: Means and Standard Deviations of Total Test Scores related to parents stimulation to enjoy reading, calculated for students from Primary and Junior Secondary Schools

SD (N = 128)		very often always	occasionally	never
	N	72	46	10
	%	56	36	8
1. Intelligence	Mean	29.88	30.45	27.9
	S.D.	8.74	7.53	6.85
2. Rote Memory	Mean	19.66	18:91	18.5
	S.D.	5.65	4.72	4.19
3. Creativity	Mean	81.55	83.71	78.7
	S.D.	32.61	23.28	22.37
4. School-Achie-vement	Mean	171.33	173.60	169.4
	S.D.	27.12	22.93	21.92
5. Composition	Mean	6.29	6.19	6.8
	S.D.	2.49	2.79	1.81

SMP (N = 137)		very often always	occasionally	never
	N	67	52	18
	%	49	38	13
1. Intelligence	Mean	42.70	43.17	44
	S.D.	7.97	7.66	7.29
2. Rote Memory	Mean	19.41	19.40	21.88
	S.D.	4.52	3.98	4.11
3. Creativity	Mean	110.86	115.80	117.38
	S.D.	33.39	34.84	25.15
4. School-Achie-vement	Mean	222.61	221.71	240.61
	S.D.	37.64	44.10	34.88
5. Composition	Mean	8.70	9.11	9.27
	S.D.	21.8	3.28	2.88

Table V-67: Means and Standard Deviations of Total Test Scores related to parental reaction to a good school-report, calculated for students from Primary and Junior Secondary Schools

SD (N = 128)		praise	give reward	no reaction
	N	59	35	34
	%	46	27	27
1. Intelligence	Mean	31.71	28.57	28.26
	S.D.	9.51	6.22	6.85
2. Rote Memory	Mean	20.33	18.62	18.20
	S.D.	5.38	5.13	4.80
3. Creativity	Mean	90.23	74.4	75.94
	S.D.	32.65	22.88	23.22
4. School-Achie-vement	Mean	178.44	165.02	168
	S.D.	28.68	19.61	21.29
5. Composition	Mean	6.52	6.54	5.64
	S.D.	2.52	2.88	2.15

SMP (N = 136)		praise	give reward	no reaction
	N	83	14	39
	%	61	10	29
1. Intelligence	Mean	43.50	40.78	42.79
	S.D.	8.22	7.93	6.79
2. Rote Memory	Mean	20.18	17.71	19.82
	S.D.	4.25	3.87	4.22
3. Creativity	Mean	117.10	107.28	108.87
	S.D.	33.33	35.01	31.61
4. School-Achie-vement	Mean	229.27	210.64	221.30
	S.D.	39.08	42.79	40.24
5. Composition	Mean	9.14	8.85	8.69
	S.D.	3.08	2.79	2.99

Table V-68: Means and Standard Deviations of Total Test Scores related to parents asking about schoolwork, calculated for students from Primary and Junior Secondary Schools

SD (N = 127)		often	occasionally	never
	N	58	64	5
	%	46	50	4
1. Intelligence	Mean	30.65	29.56	25.8
	S.D.	8.09	8.38	6.57
2. Rote Memory	Mean	19.77	19.17	17
	S.D.	5.52	5.02	2.82
3. Creativity	Mean	81.60	83.37	73.8
	S.D.	31.85	26.64	19.66
4. School-Achie-vement	Mean	174.03	171.59	160.4
	S.D.	24.72	25.57	24.11
5. Composition	Mean	6	6.60	6
	S.D.	2.26	2.80	2.54

SMP (N = 138)		often	occasionally	never
	N	45	74	19
	%	33	53	14
1. Intelligence	Mean	42.17	43.01	44.63
	S.D.	8.63	7.60	6.13
2. Rote Memory	Mean	18.97	20.01	20.31
	S.D.	4.09	4.45	4.24
3. Creativity	Mean	107.93	116.04	114.73
	S.D.	35.56	31.61	32.94
4. School-Achie-vement	Mean	218.55	228.44	223.26
	S.D.	38.67	41.43	37.32
5. Composition	Mean	9.04	9	8.36
	S.D.	2.70	3.26	3.00

Table V-69: Means and Standard Deviations of Total Test Scores related to rules at home, calculated for students from Primary Schools

SD (N = 127)		many rules	severel rules	no rules
	N	53	72	2
	%	42	56.5	1.5
1. Intelligence	Mean	28.32	31.11	32.5
	S.D.	7.74	8.42	6.36
2. Rote Memory	Mean	18.81	19.69	22
	S.D.	5.60	4.86	7.07
3. Creativity	Mean	74.64	88.16	64
	S.D.	5.60	4.86	7.07
4. School-Achie-	Mean	162.47	179.08	172.5
vement	S.D.	25.17	23.37	14.84
5. Composition	Mean	5.71	6.75	4
	S.D.	2.15	2.74	1.41

APPENDIX G

GLOSSARY OF TERMS

BP3K = Badan Penelitian dan Pengembangan Pendidikan dan Kebudayaan: Office of Educational and Cultural Research and Development

BPP = Badan Pengembangan Pendidikan: Office of Educational Development

Dep. P dan K = Departemen Pendidikan dan Kebudayaan: Ministry of Education and Culture

IKIP = Institut Keguruan dan Ilmu Pendidikan: Teacher Training College

IPB = Institut Pertanian Bogor: Institute of Agriculture in Bogor

ITB = Institut Teknologi Bandung: Institute of Technology in Bandung

ITS = Institut Teknologi Surabaya: Institute of Technology in Surabaya

Pancasila = the State Philosophy of Indonesia

Repelita = Rencana Pembangunan Lima Tahun: Five Year Plan of Development

Sarjana = Master Degree

Sarjana Muda = Bachelor Degree

SD = Sekolah Dasar: Primary School

SKKP = Sekolah Kesejahteraan Keluarga Pertama: School in Home Economics (junior)

SLTA = Sekolah Lanjutan Tingkat Atas: Senior Secondary Education, comprising the general senior secondary schools and other types of schools (e.g. vocational) at this level

SLTP = Sekolah Lanjutan Tingkat Pertama: Junior Secondary Education, comprising the general junior secondary schools and other types of schools (e.g. vocational) at this level

SMEA = Sekolah Menengah Ekonomi Atas: Senior Secondary School in Economics

SMEP = Sekolah Menengah Ekonomi Pertama: Junior Secondary School in Economics

SMP = Sekolah Menengah Pertama: Junior Secondary School (General)

SPG = Sekolah Pendidikan Guru: a Secondary Level Teacher Training College

ST = Sekolah Teknik: Technical School (Secondary level)

TKK = Taman Kanak Kanak: Kindergarten

E R R A T A

PAGE	LINE	FROM	WRITTEN	SHOULD BE
4	10	below	presumibly	presumably
18	9	below	moreever	moreover
26	6	below	iamgination	imagination
70	9	above	of	or
70	4	below	creiteria	criteria
75	2	above	insigficantly	insignificantly
76	1	below	perdent	percent
86	11	above	requlated	regulated
95	9	above	leafning	learning
113	9	above	to compere	to compare
115	2	above	extimate	estimate
115	11	below	thinkint	thinking
116	4	below	as function	as a function
125	9	below	rechness	richness
130	3	below	best	test
131	7	above	preciding	preceding
133	5	above	e.d.	e.g.
135	3	below	lest	list
135	3	below	rahter	rather
135	1	below	Appendex A	Appendix A
137	6	above	1/N	1/2 N
141	10	above	regidity	rigidity
147	3	below	handassociation	hand associations
148	1	below	schowed	showed
149	6	below	scince	since
157	7	below	atendency	a tendency
159	7	above	flec	flex
162	13	below	crative person	creative person
164	2	above	aech	each
178	9	below	SMP2	SMP1
181	11	above	subtasts	subtests
190	4	above	instUrction	instruction
192	1	below	magintudes	magnitudes
195	11	above	Figure exlusion	Figure Exclusion
201	12	above	alomost	almost
206	1	above	will be measures	will be about
206	3	above	measured of	measures of
206	2	below	Govergent Thinking	Convergent Thinking
207	5	below	schoolavhievement	schoolachievement
214	1	above	devergent	divergent
226	6	above	seamed	seemed
226	12	below	intersting	interesting
227	9	above	as measure by	as measured by
229	3	below	rathing	rating
233	5	above	reduca	reduce
233	9	above	table V-38	table V-37a.

PAGE	LINE	FROM	WRITTEN	SHOULD BE
242	5	below	rangkings	rankings
248	13	below	t-velues	t-values
253	11	below	thatn	than
256	1	above	interset	interest
276	8	above	mesures	measures
276	9	above	mesures	measures
276	2	below	refused	refuted
280	3	above	comlexity	complexity
283	4	above	cenvergent	convergent
284	7	above	substantiallierter	substantialisierter
286	4	above	consequences	Consequences
287	1	below	funtion	function
294	7	below	chages	changes
295	9	above	Seciety	Society
298	2	above	relathinships	relationships
298	4	below	proportianally	proportionally
316	6	above	appripriate	appropriate
323	2	below	reportoire	repertoire
334	10	below	Preatasi	Prestasi
337	8	below	diidentikasi	diidentifikasi

DALIL DALIL

1. Kreativitas dan inteligensi merupakan dua konsep yang majemuk, keduanya saling berhubungan dan tidak dapat dipisahkan secara tajam.

2. Dwasa ini pendidikan di sekolah semata-mata menekankan pada pemikiran konvergen (memberi satu jawaban yang benar terhadap satu persoalan). Demi pengembangan kreativitas pemikiran divergen (melihat macam-macam alternatif penyelesaian dari satu masalah) perlu juga diperhatikan.

3. Mengajar secara kreatif menuntut kesediaan guru untuk memperlakukan muridnya sebagai individu yang mampu berfikir sendiri, dan tidak semata-mata sebagai penerima informasi saja. Setelah memberikan informasi dasar, guru dapat merangsang anak untuk mengajukan pertanyaan, melihat satu persoalan dari beberapa sudut pandang, menarik kesimpulan dan memberi penilaian sendiri.

4. Pada studi validasi kreativitas suatu pendekatan multi-dimensional dan multi-kriteria adalah yang paling tepat.

5. Kombinasi dari test inteligensi dan test kreativitas mempunyai nilai orediktif (daya ramal) yang lebih tinggi dari pada setiap test masing masing.

6. Kreativitas dapat berkembang dalam suasana non-otoriter yang memungkinkan individu kebebasan dalam berfikir, pernyataan diri dan pemberian penilaian.

7. Kesukaran dalam prosedur skoring tidak boleh menjadi halangan untuk melibatkan proses mental yang tinggi dalam assessment kemampuan intelek manusia.

8. Pendidikan yang khusus bagi anak berbakat perlu dipertimbangkan, karena mereka juga termasuk anak 'luar biasa' ('exceptional') dan memerlukan penampungan yang tepat.

9. Mengintrodusir sistem pendidikan yang inovatif tidak akan efektif apabila guru sebagai pelaksana yang mengimplementasikan sistem tersebut tidak siap untuk berfungsi sebagai 'change agent'.

10. Penekanan yang berlebih-lebih terhadap peran sex seorang anak akan menghambat aktualisasi dirinya.

11. Makin banyak beredarnya buku buku komik dapat menimbulkan sikap 'gemampang' pada anak dan remaja. Hal ini perlu mendapat perhatian lebih banyak dari yang berwajib, apalagi mengingat efek dari buku buku yang kurang memenuhi syarat syarat pendidikan, terhadap pembentukan sistem norma norma susila.